FLIGHT

The AIRCRAFT ENGINEER & AIRSHIPS

First Aero Weekly in the World

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

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DIARY OF FORTHCOMING EVENTS.

Club Secretaries and others desirous of announcing the date of important fixtures are invited to send particulars for inclusion in the following list:

Feb. 2 ...	Meeting of Royal Geographical Society at Central Hall, Westminster, at 8.30 p.m.
Feb. 2 ...	Lecture by Capt. H. Hamshaw Thomas, M.B.E., M.A., F.R.S., before Royal Society of Arts, John Street, Adelphi, at 8 p.m.
April 18 to May 2	Seaplane Competition at Monaco
May 22 and 23	Aviation Competition at Juvisy in connection with Fêtes de Paris
June 1 ...	Air Ministry Competition (Small Type Aeroplanes), Martlesham Heath
July ...	S.B.A.C. International Aero Exhibition at Olympia
July (mid.)	Seaplane Contests at Antwerp
Aug. 1 ...	Air Ministry Competition (Seaplanes) Felixstowe
Aug. (end of)	Schneider International Race, Venice.
Sept. 1 ...	Air Ministry Competition (Large Type Aeroplanes), Martlesham Heath
Sept. (end of)	Gordon-Bennett Aviation Cup, France.

EDITORIAL COMMENT

THE letter which appeared in our issue of the 1st inst. from Lieut.-Col. Holt and that from Mr. Calthrop, published last week, are of surpassing interest to everyone, since they open up a prospect of full discussion of the vexed problem of life-saving in the air. They are each of them convincing until the other is read, and for that reason we trust that others will follow on with the discussion, which seems to turn on the respective capabilities of the "positive" and the "non-positive" opening types of parachute. Col. Holt argues that the former type is a snare and a delusion, so far as life-saving in aerial accidents is concerned, and advances a line of reasoning which certainly appears to have something in favour of his theories. He is followed by Mr. Calthrop, who probably knows more about the scientific side of parachuting than anyone else in the country, and who derides Col. Holt's ideas as being based on an entire misconception of the conditions.

"Positive" and "Non-Positive" Parachutes

For our own part, we certainly do not intend at this stage of the discussion to dogmatise. It is a subject upon which we have very little first-hand knowledge, and to attempt to pass judgment in such a matter, where the doctors have disagreed, would be perilously near to impertinence. At the same time it is a subject of such far-reaching interest that it needs the fullest discussion, in order that the real scientific truth may emerge. As is pointed out by both parties to the correspondence, before very long the Air Ministry will have to decide upon the exact type and principle of life-saving apparatus to be carried by commercial aircraft, and upon the decision to employ none but the right type may hang very many lives. Therefore it is essential that prior to the decision being taken no pains should be spared to discover, if that is possible, which is really the best type. We say if it is possible because we realise the immense difficulty of arriving at any real practical conclusion, owing to the danger of experiment. For example, Col. Holt tells us what he imagines will happen in the case of a falling machine which gets into a roll or spin. Mr. Calthrop, on the other hand, differs and advances a different theory altogether.

Manifestly it is impossible to experiment along the only lines which would definitely inform us as to which is right, and we have thus to fall back upon what experience there is, backed up by the soundest theory we can evolve. As to the first, there are very many officers and ex-officers of the R.A.F. with parachute experience which should prove of interest and use in the matter and it is to them we look to place their experience at the disposal of those who are seeking a solution of the problems of aerial life-saving. Needless to say, our correspondence columns are open to them, or to anyone who has either knowledge or theory which will assist in clearing up a question which is at least controversial.

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"Made in Germany"

According to a correspondent of the *Daily Express* the Germans, with characteristic lack of imagination, are doing their best to kill the aircraft industry which they are apparently so keen to foster. This correspondent states that in Warsaw recently two German passenger machines fell to pieces in the air, killing all their occupants. In Denmark, within a few weeks, no fewer than five German two-seater machines have collapsed at varying heights and the pilots and passengers killed. In Holland a two-seater Rumpler caught fire in the air and crashed, causing the deaths of the Dutch pilot and his passenger. Not at all a bad record!

It would seem that the anxiety of the German Government to get rid of their surplus war machines is at the root of the trouble. These are being sold by the Government for freight and passenger work, careless of the facts that not only are the machines essentially unsuitable for the purpose, but that they have seriously deteriorated in construction since the Armistice put them out of fighting commission. Large numbers of these obsolete fighting machines have been sold to Scandinavia, Holland and Switzerland, where their low price has found them a ready market. It is, says the *Express*, possible to buy a Rumpler for £40, the price including a spare engine! The tol of accidents is regrettable, not only on account of the loss of life, but for the bad reflex it is bound to have on the development of commercial aviation. Whether that point of view appeals to the German Government or not we do not know, but it is one that in the interests of the German aircraft industry we should have thought would have occurred to them. On other counts it is impossible not to feel some slight satisfaction at the way the Germans seem to be giving away their own show. A few more crashes and the old term of contempt, "Made in Germany," will be held to mean that German aircraft are to be avoided as something too shoddy and too dangerous to touch, even if they were given away.

On the principle that it is an ill-wind that blows no one any good, this should create an opportunity for the British manufacturer and his machine. The latter cannot be purchased for £40, even without the spare engine, but it is at least safe, as the Atlantic and Australian flights, to say nothing of such less spectacular matters as the Continental mail services, have amply demonstrated. After their experience with these out of date Hun machines, our friends the neutrals in the Great War will very possibly be ready to listen to constructors whose machines can be depended upon not to crumple in the air. But they will not listen unless the British industry is prepared with the necessary propaganda. We need scarcely emphasise the point.

Recruiting for the R.A.F.

We understand that there is still a number of skilled tradesmen required for the Royal Air Force. The demand for men is occasioned by the vacancies which will be created by the demobilisation of the R.A.F. of the Army of Occupation, which will take place during the ensuing three months. The Force is open to skilled and physically fit men between the ages of 18 and 28—ex-Service men will be enlisted up to 38—who can engage for any of the following periods: four years with the Colours and eight with the Reserve; six years Colour service and a similar term in the Reserve; or eight years with the Colours and four Reserve service.

There is no doubt the R.A.F. presents many attractions to the young and ambitious man who is master of a trade. The pay is good, while in the case of men with dependants the question of separation allowance is now under review by the Air Ministry. There is also the highly important fact to be considered that the men, whatever the trade of the individual, are certain of being employed at their own work, so that while they are serving they are getting a thorough insight and a really up-to-date knowledge and experience of that trade which must be of inestimable advantage to them on returning to civilian life. Add to this that the man is getting decent pay, good food and all clothing and lodging, and it is certain that many a poor harassed taxpayer would be glad, could he get rid of his obligations, to exchange places. Unquestionably the Service has a powerful call. It is an entirely different affair from what it was before the War, when the pay was shockingly inadequate and the professional soldier was regarded as more or less of a *pariah*—until he was needed to fight his country's battles. Now the pay is better and conditions all round have immeasurably improved while, the whole nation having been under arms, the soldier is honoured instead of being an object of almost pitying contempt. Indeed, when we review all the many advantages of the Service, we could find it in our heart to wish we were within the age limits for recruiting. At least we should be sure of decent quarters and ample and good food—and should escape the tax-gatherer.

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The Future of the Airships

There seems to have been a good deal of intelligent anticipation at work lately. It has been announced in several places that arrangements have been actually concluded between the Government and a powerful combination of shipping and armament interests to take over certain of the rigid airships from the Air Ministry and to forthwith commence with them airship services to Holland, Scandinavia and Spain; to run a weekly Transatlantic service; and to institute shorter services in the British Isles. It is perfectly true that negotiations have been proceeding along the indicated lines ever since the conference at Australia House, at which Gen. Seely acted as the representative of the Government, to lay the views of the latter before those interested in the development of commercial aviation. It may be that these negotiations are on the point of fructifying. It is equally possible that all the services prophesied may come to pass within the current year, but it is still true that they are still in the undecided stage. We may say that all of these services—and more besides, such as a regular service from England to Egypt and from Marseilles to India—have been discussed and plans made and costs ascertained so far as

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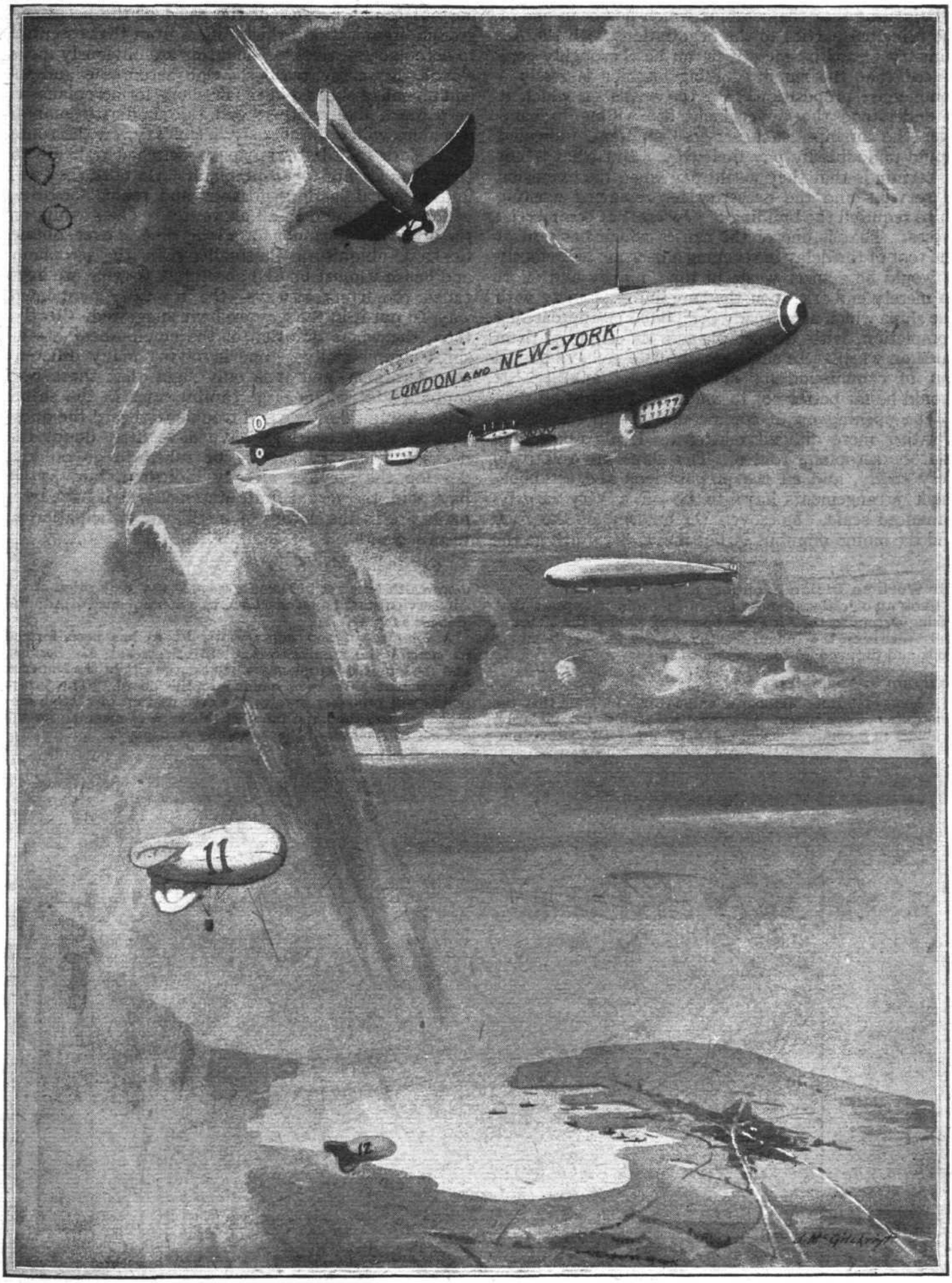

LINERS OF THE AIR: The Homeland.

is possible. But to say that all or any of them has been definitely decided upon is, to say the least, premature.

It is clear that the combine which has been one of the principal parties to the negotiations with the Air Ministry means business if it can be thoroughly convinced that the running of big airships is really a commercial proposition. On the terms on which it is understood the Government are willing to hand over the airships, such services as those indicated would undoubtedly pay their way. But what is not so certain is that they would pay when the extension of services and the necessity for replacing existing ships required the building of new craft at commercial prices. That is one of the causes which has lain at the root of the delay in reaching a decision. Obviously it would be a sheer waste of time, money and effort to merely embark upon the running of services with the ships which are already completed or approaching completion, with the set purpose of dropping them later on when these ships are obsolete or have passed out of commission for one reason or another. It would be far better not to touch the thing at all.

The opening up of commercial airship services is a rather more difficult matter to decide upon than that of aeroplane routes. The ships are relatively very costly, and all the preparations and establishment arrangements have to be on a very largely-enhanced scale. Moreover, the analogy of the tram and the motor omnibus is not inapt, inasmuch as the airship is commercially tied, as it were, to the great trunk air routes. If these do not pay, it cannot be switched off to shorter and less comparatively important routes because of the want of the necessary ground organisation, which differs from that essential to aeroplane services. The latter are obviously more elastic, for many reasons. One aerodrome and its equipment of sheds and repair shops for aeroplanes is very much like another, and the similarity enables machines which do not pay, let us say, on the route from York to Edinburgh to be switched right off to that from Cardiff to Birmingham. On both they will find identical landing grounds and repair facilities, which are common to all air routes. The airship, on the other hand, cannot for a long time, if ever, obtain the same ubiquity as its smaller sister the aeroplane, and hence it must be tied absolutely to what we have called the trunk airways—the tramway permanent way, to put it in the way we have suggested. Clearly, then, the whole question of the employment of airships commercially is one involving many different considerations, and it is only right that those who contemplate risking large capital sums in the enterprise should take time and trouble to regard the question in all its bearings. We have little doubt the decision will very shortly be taken to go on and develop the services already indicated, but, as we have said, the very definite statements that have been made are in the nature of intelligent anticipation of future events.

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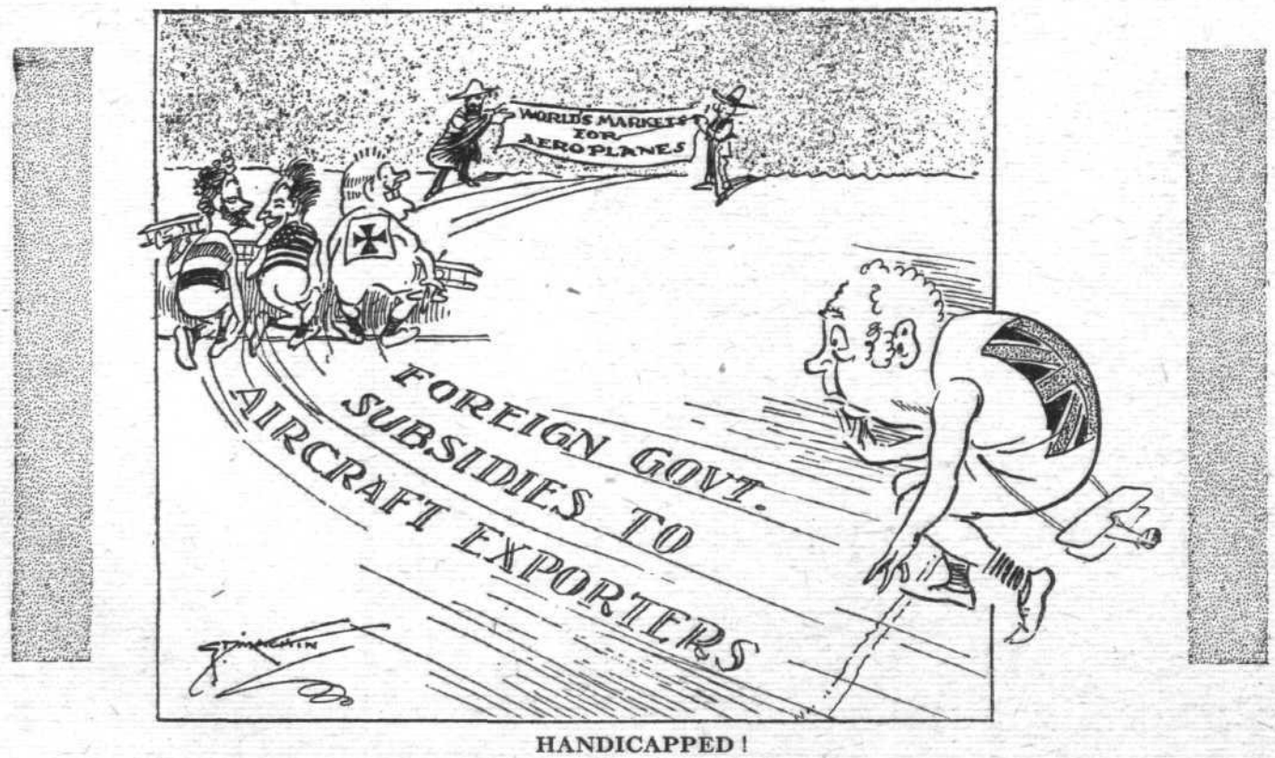
Air Work on Indian Frontier.

FROM an official statement issued in India it appears that during December the Air Force operating against the Mahsuds and Waziris on the Indian frontier carried out 245 bombing raids and dropped 46 tons of bombs.

Aviation in Australia.

MESSAGES from Melbourne and Sydney indicate that the Australian Government proposes to tackle the aviation problem in a comprehensive manner. Mr. Pearce, the Commonwealth Minister of Defence, says that the question of the Air Service must be reconsidered as a consequence of Admiral Jellicoe's report.

A joint naval and military Air Board has been formed to control the administration of the present Air Service, and the hundred aeroplanes which are the gift of the Imperial Government have been handed to the board. The future policy will probably involve the organisation of a large sea-plane service, the importance of this type of machine for the defence of Australia being generally recognised.



HANDICAPPED!

It's up to the Government to subsidise British aircraft enterprise in foreign markets, especially in South America.

J.B.: "I've beaten them in open competition, but I don't stand a fair chance in this race!"

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AIRCRAFT ENGINEER AIRSHIPS

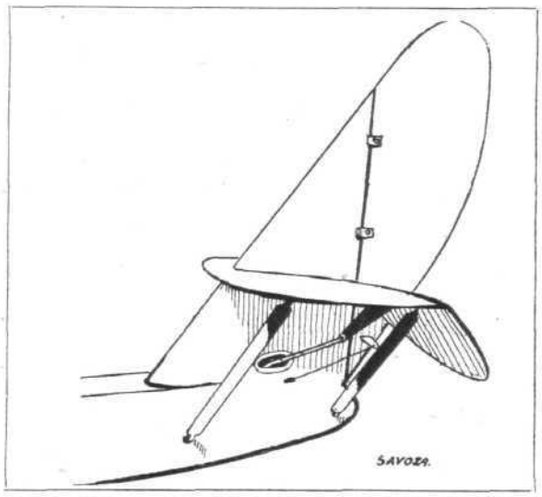
BY THE TECHNICAL EDITOR

(*Concluded from page 70*)

The Savoia Machine.

THE Italian exhibitors at the Paris Show suffered more than anybody else from the present transport difficulties. Caproni did not get his machine to the show, and had to borrow an old 1915 type triplane in order to have anything to show. The Ansaldo exhibits failed to arrive, and it was only by the most energetic measures that Mr. Santoni managed to get the Savoia flying boat to the exhibition on the morning of December 24. Chasers had to be sent out all over Southern France and Switzerland in order to locate the truck on which was the Savoia, and, in the end, the machine had to be transferred to quite a different route; otherwise it would, for all one knows, still have been meandering about in the south of France, or resting peacefully at some out-of-the-way railway siding. However, Mr. Santoni is nothing if not energetic, and so, in spite of all obstacles, the Savoia was on the stand on December 24.

Generally speaking, the show machine is similar to the Schneider Cup boat, on which Signor Janello put up such a fine performance at Bournemouth last summer. This applies to the general lines only, as the type S. 16 is larger and has seating accommodation for three or four passengers, in addition to the pilot. Two roomy cockpits in the nose of the boat contain four seats, one for the pilot and three for passengers. If desired, however, another seat could easily be provided, as there is ample room. The boat itself is of similar design to that of the Schneider Cup machine, with flat sides and bottom, except in the extreme nose, where there is a slight Vee.



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The tail of the Savoia flying boat is of somewhat unusual shape

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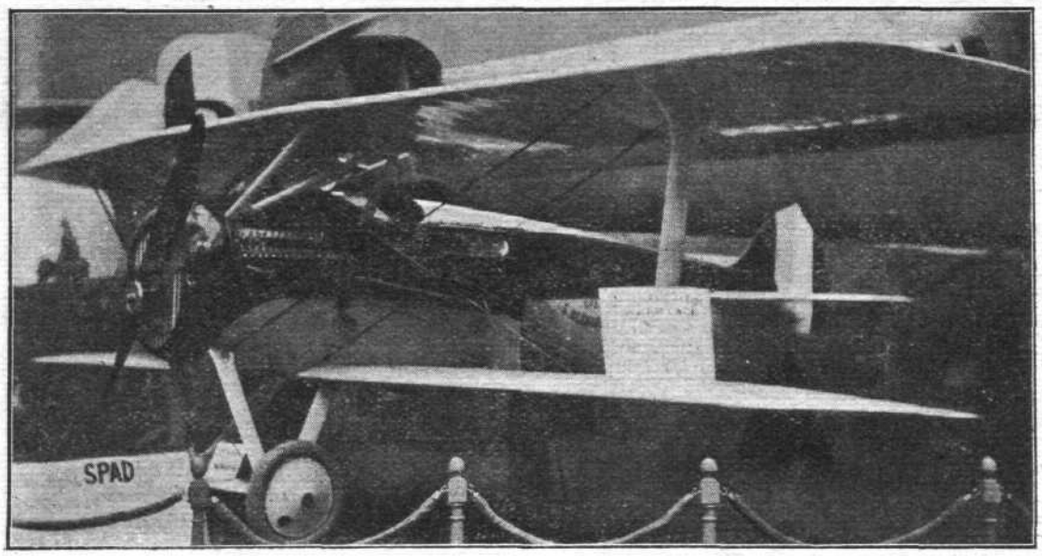
The Savoia Flying Boat



The Spad type S. 27, Limousine: Although having an enclosed cabin for the passengers, this machine has retained its streamline *monocoque fuselage*

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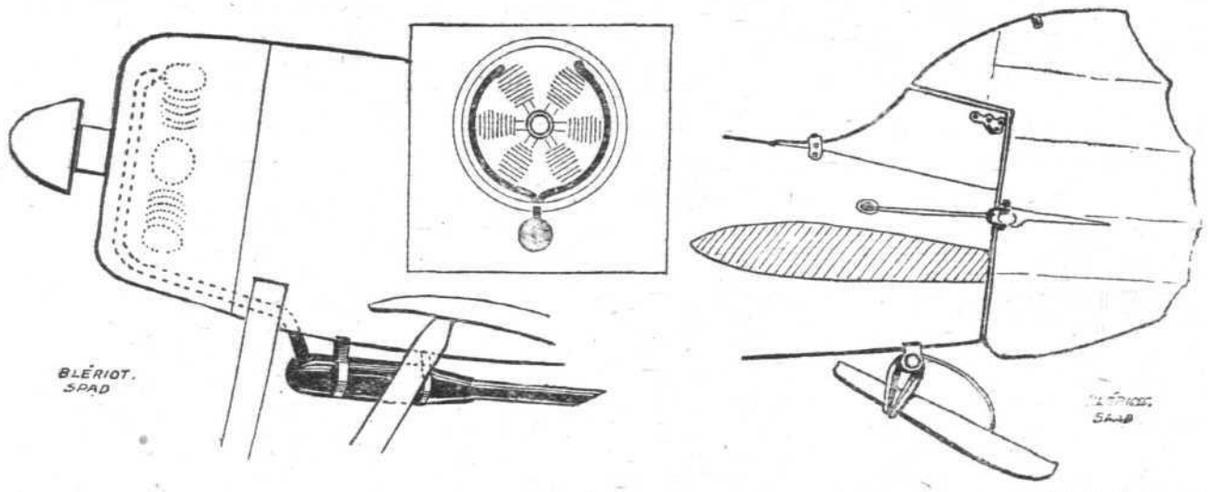
A type A 12 bis Fiat engine of 300 h.p. is mounted between the planes and drives a four-bladed pusher airscrew. The radiator is placed in the nose of the engine *nacelle*, and a starting handle projects through the radiator. It was noticed that great care has been taken to streamline the engine *nacelle*, and the exhaust pipes of the engine were enclosed in streamline casings, after the manner of the Fiat machines. Sufficient fuel is carried for a flight of four hours' duration, and, with full load, the machine has a maximum speed of 105 m.p.h., which is above the average for a flying boat, when it is considered that the loading is 15·4 lbs./h.p. The price has at present been fixed at 60,000 fr. (about £1,500 at the present rate of exchange), which must be considered very reasonable. The S. 16 gives the impression of being well-built, the workmanship and finish being of a high order.



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THE SPAD TYPE S. 30: The 45 h.p. Anzani engine on this machine is provided with a silencer placed below the *fuselage*. On the right is shown a typical Spad rudder

The Spad type S. 29, 80 h.p. Le Rhone engine, which has two seats placed close together in a single cockpit

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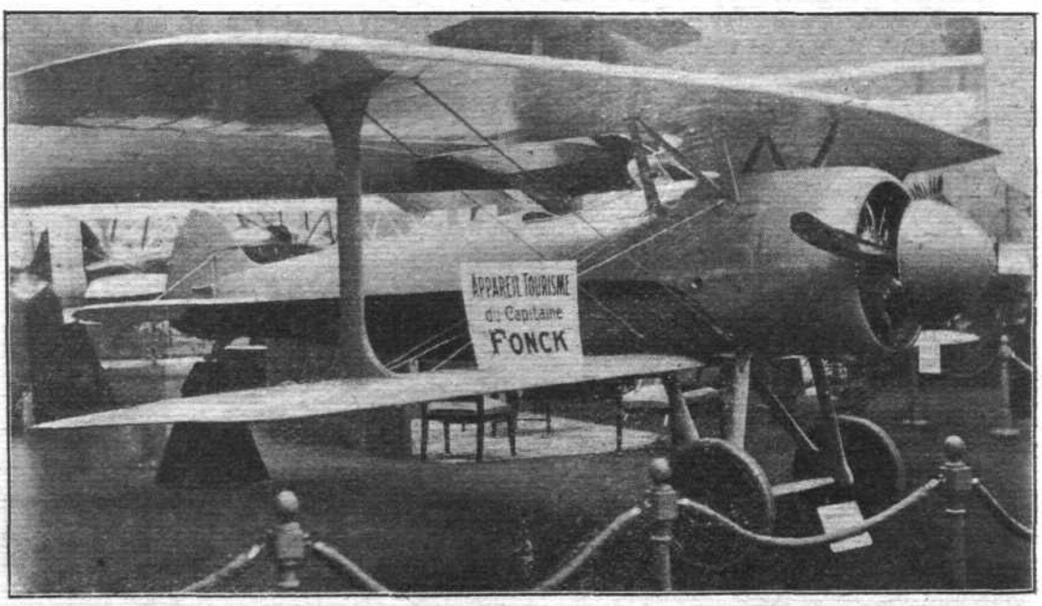
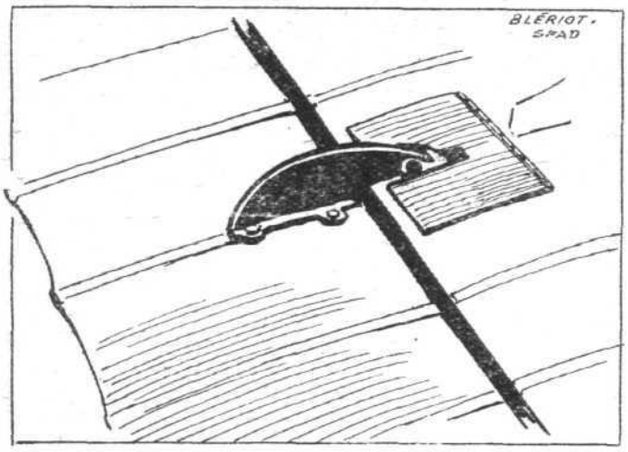
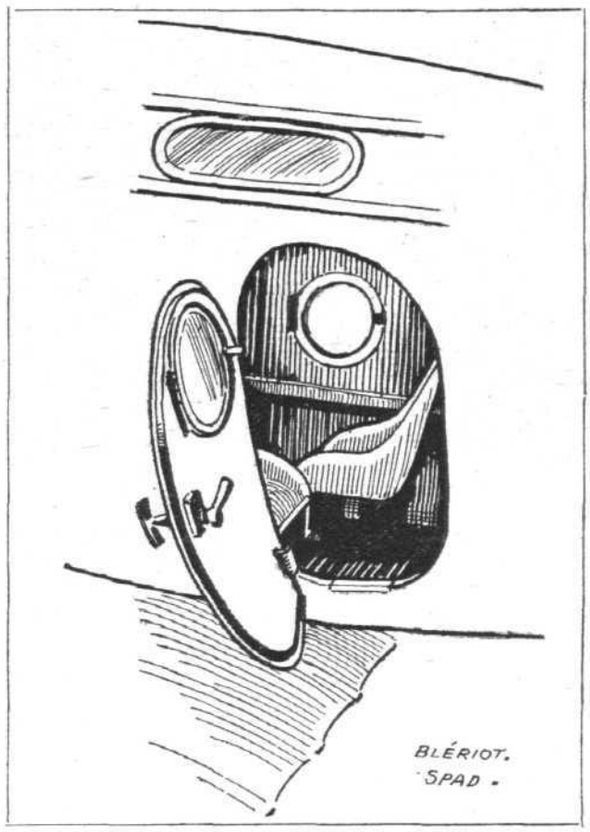


Blériot Spad.

Although being exhibited on one stand, we have thought it best to deal with the Blériot and Spad machines separately, since one has become accustomed to associate different designs with the two names. In addition to the large Blériot "Mammouth," M. Blériot exhibited three Spad biplanes, all more or less similar in general outline and bearing, in spite of their peaceful purpose, the aggressive look which one associated with the military Spads. It is somewhat difficult to define this appearance, but somehow the Spads always give one the impression of "being in a hurry to get there." This is probably due to their streamline monocoque bodies, and possibly also, to a certain extent, to the backswept top planes.

Of the three machines exhibited, perhaps that which most resembles the military types is the Limousine, Type XXVII, with 300 h.p. Hispano-Suiza engine. In spite of the fact





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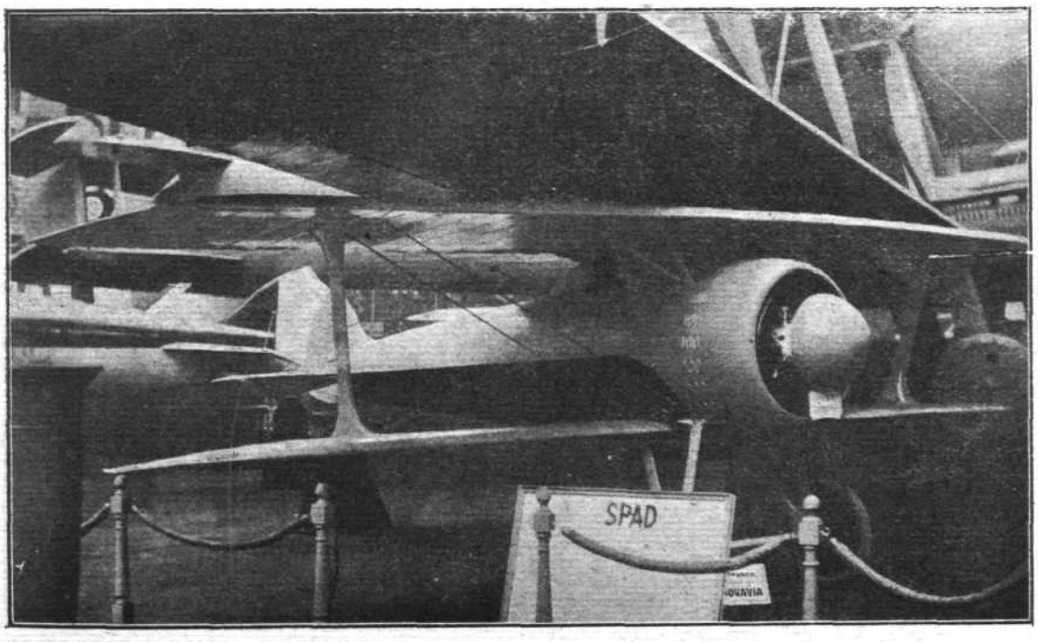
SOME SPAD DETAILS : On the left, one of the *aileron* crank levers. On the right, a sketch of the door of the Spad limousine

that the machine is a limousine, the *fuselage* is not of much greater cross-sectional area than were the military Spads. The consequence is that the space inside the cabin would be considered cramped by most British designers. As the *fuselage* is of approximately circular section, the best that could be done with the seats is to stagger them, and this is what has actually been done. The two seats are upholstered in blue velvet, while the woodwork is in polished mahogany, a combination which looks very well, and the cabin, putting aside for the moment the lack of space, looks very cosy and inviting. The pilot occupies his usual position in the cut-out portion of the centre section, and, in view of the fact that the passengers are behind him, one appreciates the need for a back-swept top plane.

Although the Type 27 is a three-seater, the wing area is quite small, and the loading must be comparatively heavy. There is only one I-strut on each side, but the wing-bracing, which is in the form of streamline wire, runs from both spars, as in a machine with a pair of struts on each side. The end attachments of the struts is covered by an aluminium casing.

A feature of this, as well as of the remaining two Spad machines exhibited, is that *ailerons* are fitted to the bottom plane only. This, by the way, is an arrangement which appears to be coming into favour with French designers. Whether the object is an aero-dynamical one, or whether the *raison d'être* is a practical one is not known, but the probabilities are that it is the latter. By fitting the *ailerons* on the bottom plane the control system is simplified, and, moreover, the *ailerons* themselves and their attachments are within easy reach. In the Spad 27 they are not balanced, as the machine is comparatively small.

The second machine shown is a Type XXIX two-seater,



The Spad sporting single-seater, 45 h.p. Anzani engine : This machine has a landing speed of less than 40 m.p.h.

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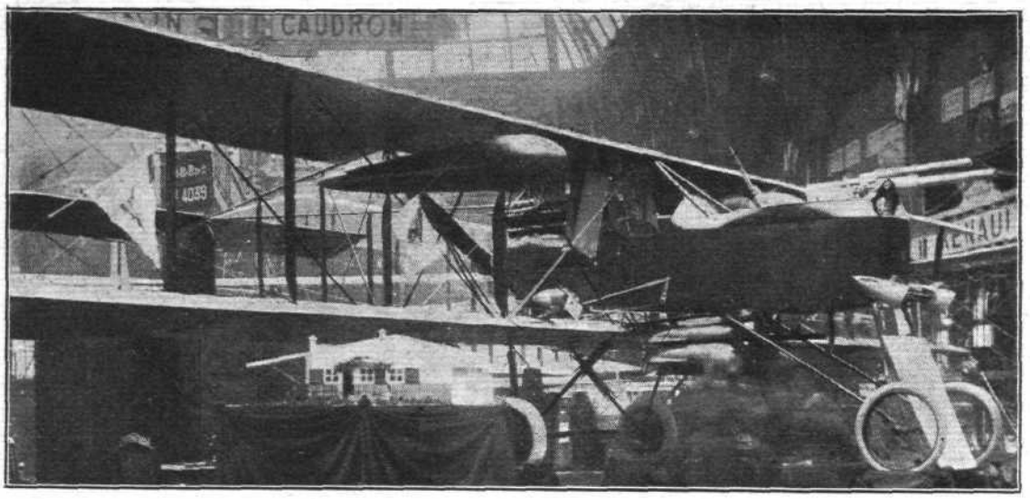

The Voisin type X

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with 80 h.p. le Rhone engine. The *fuselage* is, as usual, of monocoque construction, and the two seats are placed close together in a single cockpit, the passenger sitting with a leg on each side of the pilot as in the earlier Morane-Saulnier monoplanes. This arrangement, while not, perhaps, being particularly comfortable, has the advantage of saving space, while conversation between pilot and passenger is facilitated. The 80 h.p. le Rhone engine is mounted inside an aluminium cowl, open at the front, and there is a spinner in front of the propeller boss. This leaves an opening for the air-screw between cowl and spinner, and one noticed that the spinner in this, and in the Type XXX machine, was mounted on ball-bearings. Consequently, if the spinner is not absolutely balanced, it will probably not revolve with the screw, or at any rate, not so fast as the screw, and there is, therefore, no tendency for it to burst, as has been known to happen with spinners mounted on and revolving with the propeller.

As in the other Spads, the wings of the Type XXIX are characterised by a straight bottom plane and a back-swept top plane. The struts are of the same type as in the Limousine, but the bracing is in the form of stranded cables, the lift cables being in duplicate, with a thin wood lath in between them to form a fairing. The under-carriage is of the usual Spad type.

Underneath the wings of the huge Blériot "Mammouth" was shown a small Spad single-seater sporting machine, with 45 h.p. Anzani engine. This biplane is known as the type XXX, and has a very strong family resemblance to the other Spads. There is the same back-swept top plane, the monocoque body and the inter-plane struts. It is a very pretty and business-looking machine, as will be seen from the accompanying photograph. The spinner on this machine is somewhat smaller, probably to admit more air to the stationary engine than is required for the rotary of the Type XXIX. A two-branch exhaust collector conducts the exhaust-gases to a silencer placed some little distance aft under the *fuselage*, as shown in one of the accompanying sketches. As a sporting machine, the Type XXX should have a strong appeal, especially as the fuel consumption is low for the speed of the machine, and the landing speed is stated to be considerably below 40 m.p.h.

Vickers, Ltd.

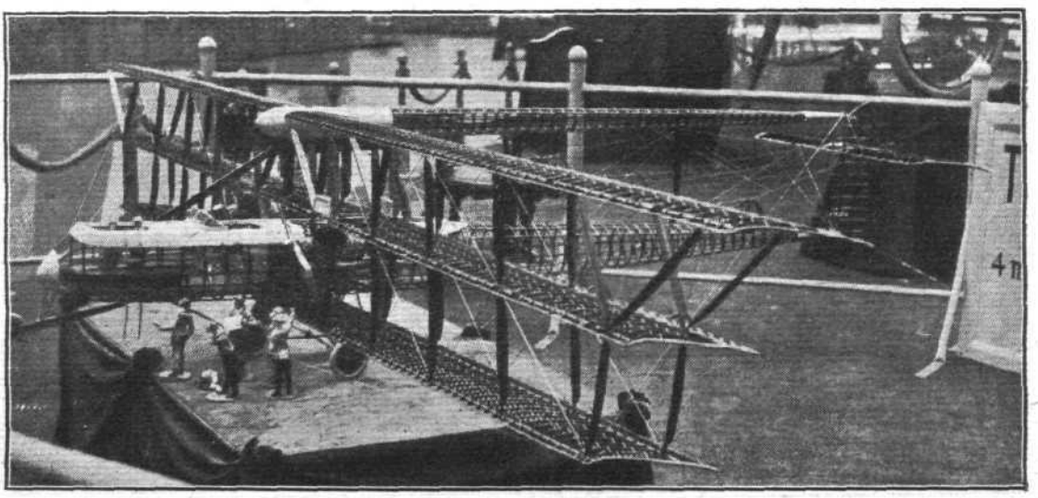
As a result of the unfortunate accident, in which Sir John Alcock lost his life, Messrs. Vickers, Ltd., were unable to show their "Viking" flying boat with retractable land under-carriage. Some photographs of this machine were, however, exhibited on the stand, and a silhouette of the "Viking" was published on page 1,643 of our issue of December 25, 1919. This machine was of very unusual design, the boat having two steps far apart, the rear one of which carried a small tail skid, for use when the machine was used on land. Two wheels were mounted on the sides of the boat, and were so arranged that they could be raised and lowered by the pilot. This, combined land and sea under-carriage is a feature which will have to be closely studied, and one trusts that Messrs. Vickers, Ltd. will build another "Viking" incorporating this feature. In addition to a number of excellent photographs and models of various Vickers machines, there was shown on this stand the fore part of the cabin of a Vickers Vimy-Commercial, and a number of metal parts and accessories, such as magnetos.

The Voisin Exhibit

As we were able to announce in our issue of December 25, 1919, Gabriel Voisin did not show any new machines, his exhibits being confined to a type X pusher bomber, which looked somewhat antiquated and out of place in a peace-time aero show. The machine is of no particular interest, except from a historical point of view. An excellent scale model of an old triplane was also shown, of which we publish a photograph. Finally, in addition to a number of smaller scale models, Voisins exhibited a model of a pneumatic hangar for aircraft, about which it is difficult to form an opinion until one has seen the full-size article.

Westland Aircraft Works

As a result of the fog, which kept the Westland machine at Lympne for days, the Westland stand was empty when the Paris show opened. However, by making the crossing on the first day that was at all possible for flying, Captain Keep managed to get the Westland Limousine to le Bourget and hence, in the dark of night, to the Grand Palais. As soon as the machine was erected the Westland stand became a



The Voisin triplane of 1915: A very fine model of this machine was shown, as illustrated in our photograph

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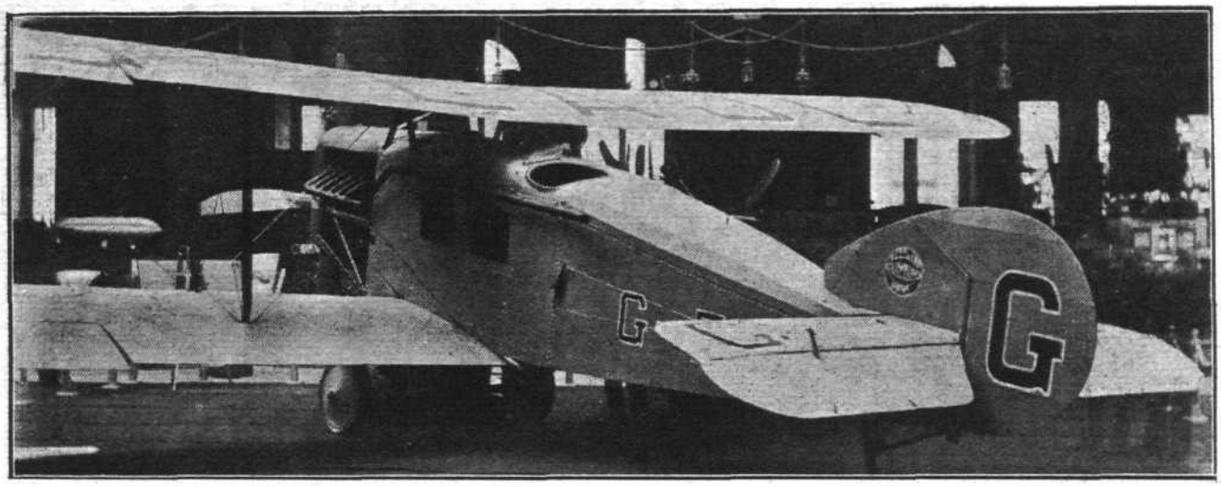

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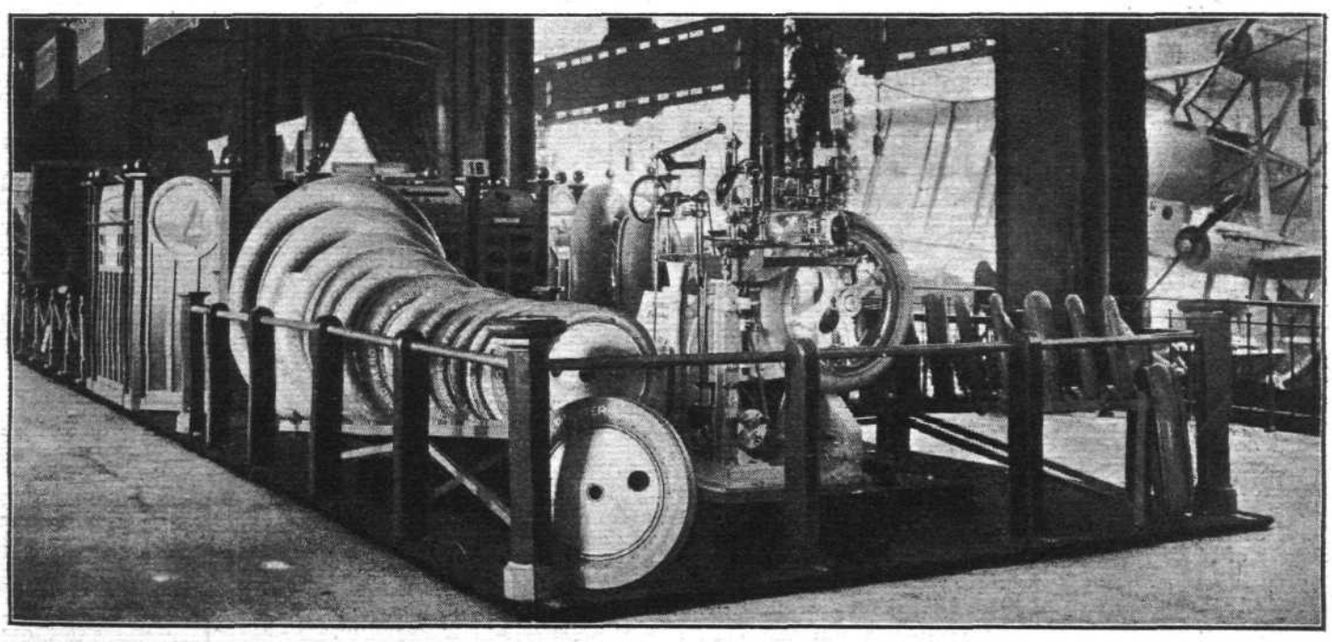
THE WESTLAND LIMOUSINE : Similar to the first machine of this type, except for the radiator, the Westland was flown over from England, carrying all the paraphernalia required on the stand

centre of interest, visitors crowding the stand to inspect the comfortable cabin of this machine. In spite of the relatively small size of the Limousine the cabin space is generous, the passengers having plenty of room to stretch their legs, while the totally-enclosed cabin, in conjunction with the long exhaust pipes, makes it possible to converse in an ordinary tone of voice. This we personally tested at Yeovil on the first of the Limousines last summer, when Mr. Bruce dictated letters to his secretary during a flight. The Westland machine was fully described at the time, and will therefore be familiar to readers of FLIGHT. In the show machine few alterations had been made, except in the manner of engine housing. It may be remembered that the Westland Limousine is built on the unit system of construction. That is to say, the *fuselage* is built in three separate sections : the engine housing, the cabin, and the rear portion. This method of construction, which has much to recommend it, makes the substitution of one engine unit for another an easy matter, and thus the new engine unit—or, rather, engine housing, for the engine remains the same, a Rolls-Royce Falcon—was readily fitted. The main alteration is that a radiator of different shape has been fitted, resulting in a much neater nose and a generally improved appearance of the whole machine.

Two Westland Limousines were flown over to Paris for the show, one of which remained at le Bourget aerodrome to give exhibition and passenger flights, while the other was exhibited on the stand. It might be mentioned that between them the two machines carried all the paraphernalia that was required on the stand, thus avoiding the use of any other means of transport. There is not the slightest doubt that the Limousine was greatly admired at the show, and was an eye-opener to many as to the space and comfort which it is possible to provide, even in a fairly small machine.

To Encourage Safety

THE Union pour la Securité en Aeroplane has decided to offer a sum of 100,000 francs for awards to inventors who improve the safety of heavier-than-air flying machines. All devices will be considered on their merits, and no restriction is placed on the style or type of the improvement, so long as marked improvement from the point of view of safety is secured. Thus stabilisers, motors and carburettors, devices for improving manœuvrability of the machine in flight or facilitating the landing, variable surfaces, variable speed, brakes, landing chassis, navigating instruments (especially for use in fog), parachutes, etc., are all eligible, and entries should be made to the Secretary of the Union at 35, rue François 1e. Paris.



PALMERS AT THE PARIS SHOW : The automatic cord-laying machine on the Palmer Tyre stand attracted a good deal of attention, and it enabled many visitors to get an insight into the careful workmanship which goes to the making of this famous tyre, which was found on practically every machine at the Show

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

SPECIAL COMMITTEE MEETING

A SPECIAL MEETING of The Committee was held on Wednesday, January 14, 1920, when there were present :—Brig.-Gen. Sir Capel Holden, K.C.B., F.R.S., in the Chair ; Maj.-Gen. Sir Seaton Brancker, K.C.B. ; Mr. Ernest C. Bucknall ; Lieut.-Col. F. K. McClean ; Lieut.-Col. Alec Ogilvie ; Lieut.-Col. Mervyn O'Gorman, C.B. ; and the Secretary.

Election of Members.—The following New Members were elected :—

John Dalgety Henderson.
Capt. Charles Stuart Angus Irwin (Royal Irish).
Arnold Thorne-Waite.

Technical and Competitions Committee.—The Report of the Meeting of the Technical and Competitions Committee held on December 30, 1919, was received and adopted.

Fédération Aéronautique Internationale.—Lieut.-Col. Mervyn O'Gorman, C.B., submitted report of the Meeting of the Bureau of the Fédération Aéronautique Internationale held in Paris on January 6, 1920. (For Report see below.)

A vote of thanks was passed to Col. O'Gorman for attending the Conference on behalf of the Club.

Joint Standing Committee of the Royal Aero Club and The Society of British Aircraft Constructors.—The report of the Meeting of the Joint Standing Committee of the Royal Aero Club and the Society of British Aircraft Constructors held on January 9, 1920, was received and adopted.

Flying Services Fund.—The report of the Meeting of the Flying Services Fund Committee held on January 12, 1920, was received and adopted.

British Records : Airships.—The following British Records were passed :—

	Duration
Pilot	Capt. W. K. Warneford, R.A.F.
Airship ..	N.S. 11.
Motor	Two 240 h.p. Fiat.
Date	February 9-13, 1919.
Place of Ascent and Descent	Duration
Longside, Aberdeen	100 hrs. 50 mins.

This performance constituted a British Record until July 6, 1919, when it was beaten by the voyage of the R 34 across the Atlantic :—

	Duration
Pilot	Maj. G. H. Scott, C.B.E., A.F.C.
Airship ..	R 34 (Wm. Beardmore and Co.).
Motor	Five 275 h.p. Sunbeam.
Date	July 2-6, 1919.
Voyage	Duration
East Fortune, Scotland—Mineola, New York	108 hrs. 12 mins.

Fire at the Club.—A unanimous vote of thanks was accorded to Mr. A. A. Dale and Capt. A. M. Van der Byl, whose timely action prevented any extensive damage being done on the occasion of the outbreak of fire at the Club on the morning of the 8th inst.

TECHNICAL AND COMPETITIONS COMMITTEE

A Meeting of the Technical and Competitions Committee was held on Tuesday, December 30, 1919, when there were present :—Mr. Griffith Brewer, in the Chair, Squadron-Leader T. O'B. Hubbard, M.C., R.A.F., Lieut.-Col. Alec Ogilvie, Lieut.-Col. Mervyn O'Gorman, C.B., and the Secretary.

The following matters were under discussion :—

Gordon Bennett Aviation Race, 1920.
Jacques Schneider International Maritime Trophy, 1920.
Aerial Derby round the World.
World's Records.

The question of future Competitions was referred to the Joint Standing Committee of the Royal Aero Club and the Society of British Aircraft Constructors.

Meeting of the Bureau of the Fédération Aéronautique Internationale held in Paris on Tuesday, January 6, 1920, at 10 a.m.

Prince Roland Bonaparte, President, occupied the Chair.

The following Countries were represented :—France, Italy, Holland, America and Great Britain.

Lieut.-Col. Mervyn O'Gorman, C.B., and Mr. H. E. Perrin attended on behalf of Great Britain.

Jacques Schneider International Maritime Trophy.—The rules for the Race for 1920 were drawn up.

The proposal of the Royal Aero Club that the machines should remain afloat for 12 hours prior to the contest was not agreed to.

The proposal of the Royal Aero Club that machines should carry a useful load as ballast of 300 kilogs. was agreed to.

The further proposal of the Royal Aero Club that the alightings on the water should form a qualifying test prior to the Race proper was also agreed to.

The Race will take place at Venice, Italy, towards the end of August or early in September.

Gordon Bennett Aviation Cup.—The regulations for this year's contest were drawn up.

The race will be over a Cross-Country course of 300 kilometres, in a circuit of 100 kilometres.

The race will take place in France at the end of September.

Round the World Flight.—The Aero Club of America submitted rules for the proposed prize for a flight round the World. It was decided to defer consideration until the regulations, drawn up by the Aero Club of America, had been circulated to the Clubs forming the Federation.

World's Records.—The Italian representative reported that although the liberty of the air had not been granted in Italy, they had accepted the invitation of the Federation to concur in the resumption of granting World's Records. It was therefore decided to grant World's Records as from January 6, 1920.

Aviators' Certificates.—On the proposal of the Royal Aero Club the tests for Private Pilots' Flying Certificates were amended as follows :—

Test A.—A flight without landing, during which the pilot shall remain for at least an hour at a minimum altitude of 2,000 metres above the point of departure. The descent shall finish with a glide, the engines cut off at 1,500 metres above the landing ground. The landing shall be made within 150 metres or less of a point fixed beforehand by the official examiners of the test without starting the engine again.

Test B.—A flight without landing around two posts (or buoys) situated 500 metres apart, making a series of five figure-of-eight turns, each turn reaching one of the two posts (or buoys). This flight shall be made at an altitude of not more than 200 metres above the ground (or water) without touching the ground (or water). The landing shall be effected by :—

(i) Finally shutting off the engine or engines at latest when the aircraft touches the ground (or water).

(ii) Finally stopping the aircraft within a distance of 50 metres from a point fixed by the candidate before starting.

Society of British Aircraft Constructors and the Royal Aero Club

A Meeting of the Joint Standing Committee of the Society of British Aircraft Constructors and the Royal Aero Club was held on Friday, January 9, 1920, when there were present :—

Royal Aero Club—
Brig.-Gen. Sir Capel Holden, K.C.B., F.R.S., in the Chair.
Squadron-Leader T. O'B. Hubbard, M.C., R.A.F.
Society of British Aircraft Constructors :—
Mr. Hamilton Fulton.
Mr. Charles V. Allen, Secretary Society of British Aircraft Constructors.
Harold E. Perrin, Secretary Royal Aero Club.

The Committee considered the advisability of organising a competition round England in the Spring. Details were discussed and the proposal was then referred to the Committee of the Society of British Aircraft Constructors.

Royal Aero Club Seaplane Competition.—It was recommended that this Race, postponed from last year, should be held prior to and under similar regulations to those governing the Jacques Schneider International Maritime Race.

International Races.—The report of the delegates at the Fédération Aéronautique Internationale Meeting in Paris

on January 6, 1920, on the Gordon Bennett and Jacques Schneider Races was received.

THE FLYING SERVICES FUND COMMITTEE

A Meeting of the Flying Services Fund Committee was held on Monday, January 12, 1920, when there were present: Squadron-Leader T. O'B. Hubbard, M.C., R.A.F., in the Chair, Mr. Chester Fox and the Secretary.

Applications for Assistance.—Twenty-eight applications for assistance were considered, and Grants and Allowances were voted amounting to £362.

ROYAL AERO CLUB RECORDS RECOGNISED BY THE FÉDÉRATION AÉRONAUTIQUE INTERNATIONALE, JANUARY 6, 1920

General Regulations

Aeroplanes

1. **Duration** (Returning to point of departure, without alighting).

2. **Distance** (Returning to point of departure, without alighting).

The distance will be determined by the measurement of the arc of a great circle, taken at sea-level, which joins the vertical of the point of departure to that of the point of arrival.

3. **Height** (Returning to point of departure, without alighting).

4. **Speed Records:**

(*a*) Speed over a given distance. Greatest speed (returning to point of departure) over:—

100 kilometres.
200 kilometres.
500 kilometres.
1,000 kilometres.

and then for every additional 500 kilometres.

(*b*) *Greatest Speed.*—Speed measured over a straight line course of 1 km., to be covered twice, once in each direction in a single flight at a maximum height of about 50 metres. This must be the height of the machine 500 metres before entering the course. The greatest speed shall be determined by the average of the speeds, without any correction.

The record for greatest speed must be beaten by at least 4 km. an hour.

The times must be taken in accordance with the instructions on the plan of the course (see figure).

5. **Records for Useful Load Transported.**—The Records 1 (Duration), 2 (Distance) and 3 (Height) may be established for useful load, in addition to the pilot:—

250 kgs. of useful load.
500 kgs. of useful load.
1,000 kgs. of useful load.
1,500 kgs. of useful load.
2,000 kgs. of useful load.

and then for every additional 1,000 kgs.

Control of Height Records

The height attained shall be determined by barometric pressure, converted into height from a standard table based on the following formula:—

$$z = 5\,(3064 + 1,73\,P - 0,0011\,P^2)\log\frac{760}{P}$$

This table must be used in all Countries represented on the Fédération Aéronautique Internationale.

The pressure readings shall be interpreted by a calibration of the instrument under an air pump at an official laboratory, under the responsibility of the Royal Aero Club. A Certificate of such calibration shall be attached to the papers of claim. The point of departure of the flight shall be 760 mm. pressure.

The height attained shall be determined by means of the standard table, whatever the height of the point of departure and the pressure at this point at the time of the performance.

Note.—The height attained in the first attempts to beat the present records must be calculated as follows:—

1. In accordance with the method employed previously, to establish the increment of 150 metres.
2. In accordance with the present regulations, which will give the figure to be assigned to the competitor.

Height records must be beaten by at least 100 metres.

The Royal Aero Club, as the representative of the Fédération Aéronautique Internationale in the British Empire, are prepared to observe attempts for Records in the above categories.

Trans-Pacific Flight

The Royal Aero Club has received a cable from the Aero Club of America intimating that the Pacific Flight Competition closes on February 29, 1920, and that the date cannot be extended.

THE FLYING SERVICES FUND

(*Registered under the War Charities Act*, 1916)

Administered by the Royal Aero Club

For the benefit of *Officers, Non-Commissioned Officers and Men* of the ROYAL AIR FORCE who are incapacitated while on duty, and for the widows and dependants of those who are killed or die from injuries or illness contracted while on duty.

Honorary Treasurer:
The Right Hon. LORD KINNAIRD.

Committee:
H.R.H. PRINCE ALBERT, K.G. (*Chairman*).
Mr. CHESTER FOX.
Squad. Leader T. O'B. HUBBARD, M.C., R.A.F.
Squad. Leader C. E. MAUDE, R.A.F.
Group Capt. C. R. SAMSON, C.M.G., D.S.O., R.A.F.

Secretary:
H. E. PERRIN.

Bankers:
Messrs. BARCLAYS BANK, LTD., 4, Pall Mall East, London, S.W. 1.

Subscriptions:	£	s.	d.
Total Subscriptions received to December 20, 1919	16,962	6	7
Camp Superintendent, N.W. Frontier Province, Peshawar, India	2	0	0
Total, January 16, 1920	16,964	6	7

The Royal Aero Club

Hydro-aeroplane Competitions, Monaco

The following Regulations translated from the French are issued by the Royal Aero Club who will be pleased to answer all enquiries to intending Competitors:—

(Translation)

HYDRO-AEROPLANE COMPETITIONS (FOURTH YEAR), APRIL 18-MAY 2, 1920

PRIZES: 160,000 francs

Grand Prix de Monaco

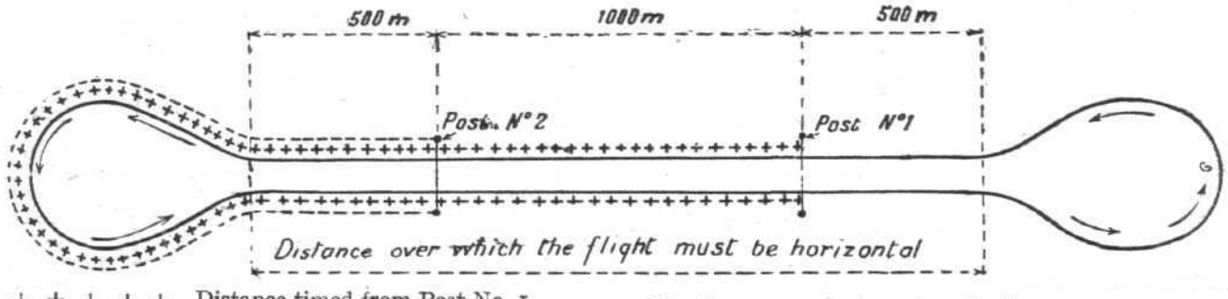
Monaco-Corsica-Bizerta-Tunis-Susa-Bizerta-Monaco (About 2,000 kilometres)

Prizes: 150,000 francs

ARTICLE 1.—The International Sporting Club of Monaco is holding from April 18 to May 2, 1920, a Competition called

Speed Records

Plan of Course



\+ + + + + Distance timed from Post No. 1.
– – – – – Distance timed from Post No. 2.
——— Course followed by aircraft.

The time + + + + + less the time – – – – – gives the average time of the double flight.

the "Grand Prix de Monaco." The Competition is reserved for aviators certificated and licensed in the countries which were Allies of France during the recent War, viz., France, the British Empire, Belgium, America, Italy, Japan, etc. The Competition is to pilot a hydro-aeroplane, viz. a machine of Class C., starting from the water, alighting on the water and starting off again from the water. Machines must be constructed in the countries mentioned above, and must be equipped with engines manufactured in these countries.

The Competition will be held under the Competition Rules of the Aero Club of France, and will be judged in accordance with these Rules.

ARTICLE 2 (*Route*).—The "Grand Prix de Monaco" will be contested on the following route, which has been submitted for approval to the public authorities interested :—

1st Stage—
Monaco : Start from the water.
Ajaccio or Bastia : Alightings on the water.
Bizerta : Arrive on the water.
Distance about 750 kilometres.

2nd Stage—
Bizerta : Start from the water.
Tunis : (Compulsory turning point).
Susa : (Compulsory turning point).
Bizerta : Arrive on the water.
Alighting on the water at Tunis and Susa is optional.
Turning at Tunis on the return journey is optional.
Distance about 500 kilometres.

3rd Stage—
Bizerta : Start from the water.
Monaco : Arrive on the water. (Alightings optional.)
Distance about 750 kilometres.
Total 2,000 kilometres.

The exact starting, alighting and arrival points will be fixed later, after consultation with the public authorities.

It has, however, been already decided that the points chosen will be on the most sheltered water.

Nature of Competition

The Competition is based on the following supposed scheme :—

An aerial transport company has received a grant from the Government for the postal service between the South of France and Tunis : To collect mails at Monaco, drop some of them in Corsica, either at Ajaccio or Bastia (the railway terminus), to take back the mails from Corsica, drop at Bizerta and Susa the mails for those places, to clear all South Tunis and return from Bizerta to Monaco.

The Company have to assure the State a minimum tonnage of 400 kilog. and accomplish the journey if necessary at a minimum altitude of 2,000 metres.

The Company, therefore, make an appeal to the Allied nations to experiment with their machines along this line which concerns the transit to France, England and Belgium, crosses the Italian waters at Sardinia, links up in Tunis with the line of North Africa, in the Sahel with the lines of Southern Algeria, central and eastern Sahara and with Tripoli and Egypt through Barka.

The Company propose the following programme on the route set out above.

Programme of the Competition

The Competition will consist of a series of individual trials, each competitor being free to make as many starts as he thinks fit during the whole period of the Competition, and each one of his performances will go down to his credit.

The Competition is open for 15 days, starting on Sunday, April 18, and terminating on Sunday, May 2, 1920, inclusive, and each day the controls along the route will be open from 6 a.m. to 6 p.m. Greenwich Summer time.

Eliminating Trial

Before being officially authorised to start, the competitor will have to undergo the following eliminating trial at Monaco :—

Climb to a height of 2,000 metres within a maximum time of 45 mins., carrying on board a load of 400 kilog. representing mails, in addition to petrol, instruments and in general all useful equipment on board. They will have to undergo this test with their full load of petrol.

In the case of machines having on board a wireless sending apparatus with motor independent of the aircraft engine, the load will be reduced to 370 kilogs.

All machines will have to be equipped with a wireless sending apparatus (power 500 watts.)

During all three stages competitors will have to carry the entire weight specified above.

When calling at Corsica, however, they will have to hand to their employer a sack weighing 1 kilo. and receive in exchange another sack of the same weight which will represent mails.

This sack will be handed each day by the observer of the alighting to the competitor's employer, who will be responsible for the receipt of it. This will be done in order to avoid any claim being made for delay to the machine. Every evening when the control is closed the employer will hand it back to the observer.

At Tunis and Susa competitors must make a flying turn round the lighthouse on the pier. They will be given an official plan which will show them the exact turning point.

Classification

There will be two classifications, one to prove the regularity of the flight, which will form the basis of a regular postal service, the other to find out the average speed of the machines.

It is the combination of these two classifications which will constitute the total classification, as follows :—

Classification : 1. Regularity

Competitors must endeavour to cover the whole route and the three stages set out above in three consecutive days, being one stage per day, each day consisting of 12 hours, from 6 a.m. to 6 p.m.

Only those competitors who start, alight and arrive on the three stages between the hours specified above will be considered in this classification, and the official observer must satisfy himself that a machine has accomplished the journey within the times specified.

A Competitor arriving at the end of a stage after six o'clock in the evening and before six o'clock of the following morning can only be observed when the control is opened the following morning. He will be considered to have missed the evening post, and to have had to wait for the morning post.

He may, however, if he thinks fit and the weather is favourable start off again the same day to continue his course ; but this will not enable him to obtain a late entry on his next arrival on the plea that he did not start till late.

In general, however, and whatever the actual time of starting, the machines will cease to be observed each evening at 6 o'clock, and they are free to start off again as early as they like after 6 a.m. the following morning. In this case the time of arrival and departure would be the same.

The competitors will be classified in numbers of days, the first category comprising the machines accomplishing the journey in three days, the second in four days, etc.

Machines accomplishing the journey in less than three days will not be taken into account, but will be classed in the first category (three days).

Competitors are, however, permitted if they think fit and they wish to take advantage of favourable weather conditions to try to accomplish the journey in two days or less. But each departure on one stage, viz., from Monaco, Bizerta (outward) and from Bizerta (returning) will be one day to his account and the competitor is liable to be penalised for an extra day if he arrives too late the same day at the end of one stage. The object of this arrangement is to allow for different weather conditions.

Classification : 2. Speed

A speed test will be held on the third stage, Bizerta-Monaco, alighting being optional. The time will be taken at which a competitor crosses the line of departure in flight at Bizerta, and the exact time at which he crosses the line of arrival in flight at Monaco, it being understood that he must start from and arrive on the water.

Final Classification

Competitors will be classed in the first place in order of regularity as set out above, and in case of a tie they will then be classed in order of speed ; *e.g.*, Competitors will be classed in the first place according to the number of days occupied in completing the whole course, a day being defined as above in the Classification for Regularity and in the case of a tie in the classification for regularity, according to the classification for speed which can only be done in the case of competitors tieing as regards regularity.

Prizes

Prizes will be given in accordance with the final classification.

150,000 francs in prizes have been offered by the International Sporting Club of Monaco, and they will be divided as follows :—

First Prize	100,000 francs.
Second Prize	30,000 francs.
Third Prize..	12,000 francs.
Fourth Prize	8,000 francs.
Total	150,000 francs.

A commemorative medal will be awarded to the pilot and mechanics of each machine accomplishing the full course.

Conditions

Entry Forms accompanied by an Entry Fee of 100 francs must be sent to the International Sporting Club of Monaco, 10, rue Auber, Paris, or to the Aero Club of France, 35, rue François Premier, Paris.

The following particulars must be given :—

Name and nationality of the constructor of the machine, engine and floats.

The name of the pilot and mechanics need not be given until the time of starting.

By entering, the pilots or principals agree :—

1. To be cognisant of and abide by the attached Rules and the Competition Rules of the Aero Club de France.

2. To be liable for all material or personal accidents either to themselves, their employés, third persons, their machine or any other, personal or otherwise, either during trials or during the competition, and to assure the Organising Committee of this in advance.

They must take out an insurance for this purpose, the Organising Committee declining all responsibility.

Altitude Contest for Hydro-Aeroplanes

The International Sporting Club of Monaco also offers a sum of 10,000 francs to be divided amongst the pilots for the establishment of the hydro-aeroplane altitude record in Monaco Bay and for a speed trial confined to hydro-areoplanes having attained a certain altitude.

The altitude contest will be open from April 18 to May 2, and a prize of 2,500 francs will be awarded to the holder of the record at the end of the contest.

A sum of 2,500 francs to be divided into five prizes of 500 francs will also be awarded to the pilots who, on dates fixed by the Committee, between April 18 and May 2, have accomplished the best performance on each day.

Five days will be chosen, and there will be a prize for each day.

Speed Test : Monaco–Cannes–Monaco–Mentone–Monaco (About 125 Kilometres)

The International Sporting Club of Monaco will also hold on Sunday, April 25, a speed contest for hydro-aeroplanes over the course Monaco–Cannes–Monaco–Mentone–Monaco, alightings being optional, for prizes amounting to 5,000 francs.

The start and arrival will be on the water in Monaco Bay, and the turning points passed in flight.

Starts will be made when ordered.

Times will be taken at starting and on arrival in flight.

This contest is confined to hydro-aeroplanes having on the date of starting attained an altitude of at least 3,000 metres in less than an hour. They must have the same motor and the same carrying surface.

First Prize	3,000 francs.
Second Prize	1,500 francs.
Third Prize..	500 francs.

The two contests—altitude contest and speed contest—are confined, as in the case of the Grand Prix de Monaco, to licensed pilots of Allied nationality, as stipulated for the Grand Prix de Monaco and using material of the same origin.

The joint entry fee for these two contests is 200 francs, which will be returned to the starters, 100 francs being allowed for each contest. Competitors not qualifying for the speed contest will be considered as having forfeited the entry fee.

The amount of the entry fees not returned will be divided in equal parts among the competitors who have accomplished at least one official performance in the altitude contest.

Entries will be received on the same dates and at the same places, accompanied by the same declarations, as for the Grand Prix de Monaco.

President of the Committee,
CAMILLE BLANC,
Clerk of the Course,
GEORGES PRADE.

Offices : THE ROYAL AERO CLUB,
3, CLIFFORD STREET, LONDON, W. 1.
H. E. PERRIN, Secretary.

THE ROYAL AIR FORCE MEMORIAL FUND

THIS fund, of which H.R.H. Prince Albert, K.G., is patron, and the Right Hon. Lord Hugh Cecil is Chairman, has just issued an appeal which should meet with a ready response on the part of all who take any interest whatever in the work of the Royal Air Force. The appeal, which is signed by Prince Albert, Lord Hugh Cecil, M.P., Air-Marshal Sir Hugh M. Trenchard, Bt., K.C.B., D.S.O., Air Vice-Marshal Sir John Maitland Salmond, K.C.B., C.M.G., C.V.O., D.S.O., and Air Vice-Marshal Arthur Vyell Vyvyan, C.B., D.S.O., is as follows :—

Royal Air Force Memorial Fund

" We should be very glad if you would afford us the hospitality of your columns to make an appeal on behalf of the Royal Air Force Memorial Fund.

" This Fund has been established to commemorate the services of the Royal Naval Air Service, the Royal Flying Corps, the Australian Flying Corps and the Royal Air Force during the War, by an organisation which will secure such lasting benefits to the Officers and Men of the Royal Air Force, and their dependents, as may be worthy of the greatness of the achievements commemorated.

" The Executive Committee of the Royal Air Force Memorial Fund, while taking care that their Memorial should distinctly commemorate the Royal Air Force, have equally been anxious to avoid mischievous overlapping, and have with that purpose put themselves into communication with the United Services Fund, with Lord Haig's Central Committee and with the Flying Services Fund.

" The objects the Executive Committee have decided to pursue are :—

" The erection of a commemorative Monument to the fame of the Royal Naval Air Service, the Royal Flying Corps, and the Royal Air Force, including the Officers and Men who joined the Force from Canada, New Zealand, South Africa and the other over-seas Dominions.

" The establishment of places of residential education (like Trafalgar Homes) for the Children of Airmen.

" The provision of bursaries available at approved schools.

" Generally the provision of such treatment and the rendering of such assistance as means may permit, either directly or in co-operation with other organisations, to Officers and Men and their dependents who may be disabled, sick, or otherwise infirm.

" All Officers and Men of the Flying Services, whether from the Dominions or from the United Kingdom, will, of course, be eligible for these benefits.

" These objects will be furthered by the Royal Air Force Memorial Fund in the closest co-operation with the United Services Fund and with Lord Haig's Committee in accordance with the requirements of each particular object so as to prevent overlapping in expenditure ; and the Executive Committee are confident that they will both fittingly commemorate the precious national services of the Royal Air Force and realise with due economy the benefits for those whom it is sought to help. An approximate estimate shows that a large sum, probably £400,000 will be required. It is necessary, therefore, to appeal to the abundant generosity of those who honour the memory of the services and sufferings of the Royal Naval Air Service, Royal Flying Corps, the Australian Flying Corps and the Royal Air Force during the War.

" We know that in many hearts the memory of these services glows unforgettable. To some it is intertwined with the agony of bereavement ; to some it speaks of happy friendship and pleasant reminiscence ; but by all who endured the anxieties and rejoiced in the glory of the Great War, not the least honoured place in the proud and thankful recollection of its chequered days is given to the skill and nerve of the brave men who first made war in the unbounded arena of the air, and to the ingenuity and industry of those who rendered that gallant fighting so fruitful to the cause of victory. To all in whose minds these memories are enshrined we now appeal ; of everyone whose heart quickens with pride or pain when he recalls the warfare in the air we ask that these sentiments of patriotism and of affection shall now be shown in a liberality not unworthy of their high temper, and that he will join with us in raising a lasting Memorial which shall carry down to a remote posterity the shining tradition of the Royal Air Force in the War, of its fine courage and its great renown.

" Inquiries, Donations and Subscriptions should be addressed to—

" The Secretary, Derek McCulloch, Esq.,
" 25, Victoria Street, Westminster,
" S.W. 1."

AIRCRAFT UNDERCARRIAGES

BY JOHN D. NORTH, F.R.AE.S., F.R.MET.SOC.

(*Continued from page 76.*)

MESSRS. LUKE TURNER AND CO., of Leicester, have made some interesting discoveries in their researches on the best form of rubber shock-absorber. They say :—In the case of a ring, if thoroughly wetted when under a load sufficient to produce about 50 per cent. extension, it will be found to have a permanent extension of 8 per cent. measured on the straight length, but it returns to its original dimensions as the moisture evaporates. To obtain a uniform initial tension on each ring the internal diameter should be calculated from the minimum position of the spools and 8 per cent. deducted from the circumference. The ring is then made to this internal diameter, saturated with water when under tension and then placed on the spools in a wet condition. When dry the initial tension will correspond with the load required to produce an 8 per cent. extension, which load can easily be found by a static test on the ring when in a dry condition. Mr. Turner hopes in the near future to improve on this by treating the ring so that it retains the 8 per cent. extension, and when required for use it will be immersed in some liquid solution which will allow it to shrink when on the spools. This method, if successful, will be very convenient for spare rings for renewals.

Their test results show in the case of a ring the energy absorbed in hysteresis is a larger percentage of the total energy than in the case of the ordinary cord. In a ring it varies from 15 to 20 per cent.

These hysteresis figures have been obtained by static tests, *i.e.*, the load gradually increased or decreased. On the other hand, the few experiments that have been made with rapidly alternating loads seem to indicate that the hysteresis energy shrinks to a very small percentage of the total, both for the ring and ordinary cord. As a rapidly alternating load represents the condition when an aeroplane lands, it would seem that it is doubtful whether rubber, either as ring or cord, will act as a shock dissipater.

(Fig. 22.) The effect of repetition of loading is very marked. Messrs. Turner have investigated the effect of repeated application of load to produce 66 per cent. extension.

After 10,000 repetitions the energy absorbed in stretching to 66 per cent. has fallen off nearly 23 per cent., whilst the hysteresis expressed as a fraction of the energy expended has fallen off from 32 per cent. to 17½ per cent. The figures in the repetition tests are as under :—

	Work done in stretching 66 per cent.	Hysteresis.	Per cent. hysteresis.
Initial test	79·0	25·3	32·0
After 500 repetitions ..	62·5	15·0	24·0
After 10,000 repetitions ..	61·0	10·6	17·4

Experiments carried out by Boulton and Paul show that with a ten-inch ring subjected gradually to a load of half a ton the hysteresis, if the time taken to apply the load is half a minute, is less than a fifth of that when the time taken is four minutes (Fig. 23).

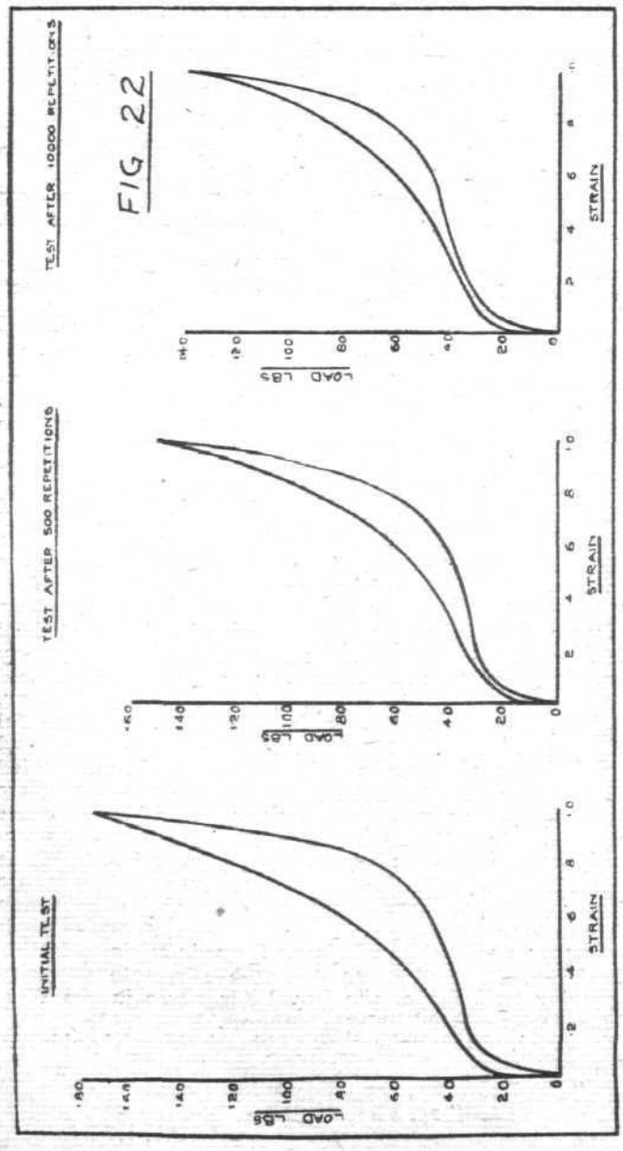
A ten-inch rubber shock-absorber ring ⅝ in. diameter was attached to hooks in the testing machine and a load of half a ton applied at different rates.

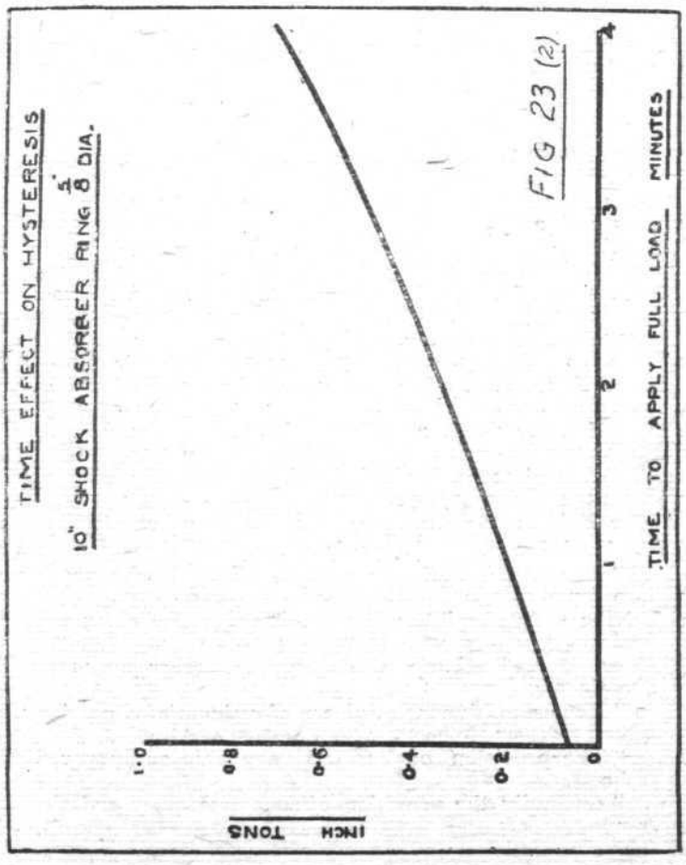
The time taken for the full load to be exerted was ½, 1, 2½, 3 and 4 minutes.

In each case a number of observations of the extensions corresponding to different fractions of the full load were noted, from which a series of hysteresis curves were plotted.

The areas enclosed by these curves were determined and plotted on a rate of loading base. The curve drawn approximately through the points gives at once the effect of changing the rate of applying the load.

In the case of an undercarriage fitted with pneumatic tyres and rubber shock-absorber a sufficiently near approximation for the shock-absorbing capacity may be arrived at by plotting the load deflection curve of the rubber shock-absorber and tyres, and integrating with the maximum permissible load as superior limit. More accurately the kinetic energy of the wheels and tyres and axle may be considered separately (since it does not affect the springs) and account may be taken of axle deflection. In most cases,





however, the approximation suggested is sufficiently accurate, and has the advantage of being extremely easy.

Oleo Gear

In its simplest form the oleo gear consists of a piston (A) of circular cross section which can move in a cylinder (B) against a resistance. This resistance is provided by oil, which as the piston advances is forced through some small orifices (C) in the piston head with a very high velocity.

If A = effective area of piston head, *i.e.*, total area less area of orifices.
a = effective area of orifices.
l = length of orifice.
m = hydraulic mean depth of orifice = area of orifice/perimeter.
V = velocity of piston.
v = velocity of liquid through the orifices.
F = frictional coefficient due chiefly to the surface of the orifices.
ρ = density of liquid.
p = excess pressure behind the orifices in lbs.

We have
$$\frac{p}{\rho} = \frac{v^2}{2g}\left(1 + \frac{Fl}{m}\right)$$

(See Gibson on "Hydraulics and its Applications.")

For continuity of liquid flow
$$AV = av$$
and therefore
$$\frac{p}{\rho} = \frac{V^2}{2g} \cdot \frac{A^2}{a^2}\left(1 + \frac{Fl}{m}\right) \qquad (1)$$

Total resistance
$$pA = \frac{\rho V^2}{2g} \cdot \frac{A^3}{a^2}\left(1 + \frac{Fl}{m}\right) = kV^2$$

If W is the weight of an aeroplane with oleo gear on either wheel of a two-wheeled undercarriage, it follows that
$$2kV^2 = -W\frac{dV}{dt} = -WV\frac{dV}{dx}$$
$$\therefore \frac{2k}{W}dx = -\frac{dV}{V}$$

For a movement x of the piston head with a fall off in velocity from V_0 to V_1 we have, integrating the last equation.
$$\frac{2k}{W} \cdot x = \log_e \frac{V_0}{V_1}$$
or
$$V_1 = V_0 e^{-\frac{2k}{W}x} \qquad (2)$$

This equation gives the velocity at any time in terms of the original velocity and the piston travel.

The pressure p may, however, rise to a value considerably higher than is convenient. In the case of a simple oleo a valve may be provided, set so that whatever the vertical velocity the load on the piston will not be sufficient to break the aeroplane, though, of course, there is no guarantee that with high velocity all the kinetic energy of the machine will be absorbed. If no valve is fitted there is a definite limiting velocity above which the forces set up on the gear can no longer be sustained by the aeroplane. A valve (D) is, therefore, set in the piston head, which opens as soon as p rises above a value previously determined upon. By this arrangement the maximum pressure on the sides of the cylinder and on the piston head is known, and the gear can be made just strong enough to stand this pressure.

Until the valve closes the retardation is constant and given by
$$\pi A = -WV\frac{dV}{dx}$$
where π is the pressure at which the valve opens.

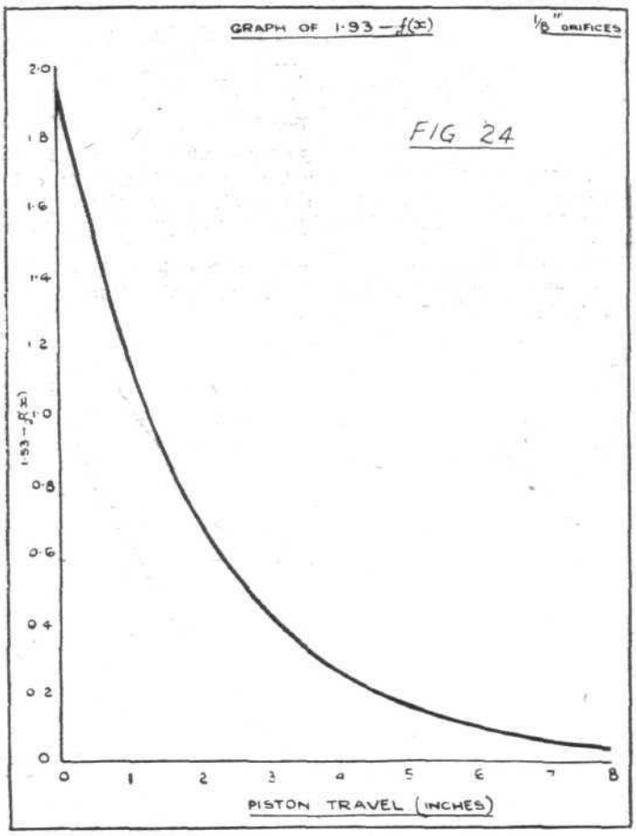
The value of V when the valve closes is given by
$$\pi A = kV^2 \qquad (3)$$
and when the valve closes the equation (2) holds providing V_0 has the value determined in equation (3).

The next stage in the development of the oleo gear is that the free movement of the piston, besides being retarded by the oil, is further retarded by some spring device shown diagrammatically at (E). In an aeroplane this resistance is generally provided by the extension of elastic.

If T_e is the tension in the elastic at any stage, the rate of retardation is given by
$$T_e + 2kV^2 = -W\frac{dV}{dt} = -WV\frac{dV}{dx}$$

In practice this equation is not, as a rule, amenable to mathematical treatment, and the slowing up of the aeroplane is best done by step by step integration.

When, however, the oleo gear is fitted with a valve to keep the pressure in the cylinder below a certain value, an approximate value for the total distance travelled by the piston before the energy of the aeroplane is absorbed can be obtained in the manner shown in the following example. (No further extension of the general case can be given.)



For a particular design of oleo gear
$$\frac{A}{a} = 108$$
A = 3.98 sq. in.
F = 0.005 (*see* Gibson on "Hydraulics")
$$l = \frac{1}{12} \text{ ft.}$$
$$m = \frac{1}{384}$$
$$\frac{Fl}{m} = 0.16$$
$$\rho = 62.4$$
With these values $p = 91\,V^2$
$$k = 362$$

The weight of the aeroplane is 7,500 lbs.

and so $V = V_0 \times 10^{-0.1125x}$ where x is now in inches,
$$\pi = 91\,V_1^2$$
where V_1 is downward velocity of the aeroplane when the valve closes.

The pressure after a distance of travel x inches after the valve closes is given by
$$p = 91\,V^2$$
$$= 91\,V_1^2 \times 10^{-0.225x}$$
and the total pressure $= pA = 362\,V_1^2 \times 10^{-0.225x}$.

The work done in travelling this distance x inches
$$= \int_0^x 362V_1^2 \times 10^{-0.225x}\,dx$$
$$= 3.98\,\pi\,1.93\,(1 - 10^{-0.225x}) \text{ inch pounds} \qquad (4)$$

The function $1{\cdot}93\,(1 - 10^{-0.225x})$ has been plotted against x, and with the help of the graph it is simple to find the work done for any distance of travel x up to 8 ins. after the valve closes (Fig. 24).

The work done in the oleo with constant total pressure $3{\cdot}98\,\pi$ over a distance of travel of y inches with constant $p = \pi$ is

$3.98\,\pi y$ inch lbs.

(Fig. 25.) If E_y represents the work done in extending the elastic y inches beyond its original extension, the total work done, for each leg, is

$E_y + 3{\cdot}98\,\pi y$ inch lbs.

The energy lost by the aeroplane is

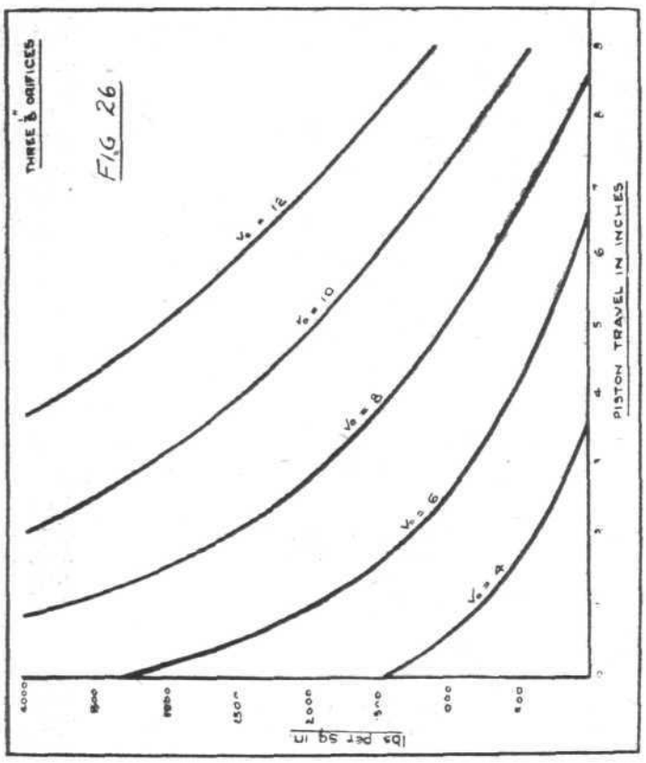
$$\tfrac{1}{2} \times \frac{W}{g} (V_0^2 - V_1^2) \times 12 \text{ inch lbs.}$$

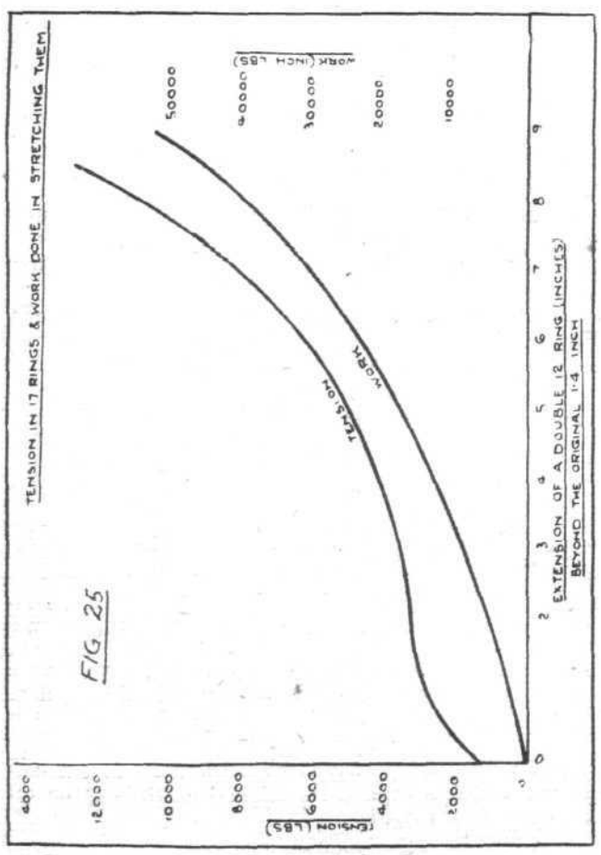
$$\therefore E_y + 3.98\,\pi y = \frac{3W}{g} \times \left(V_0^2 - \frac{\pi}{91}\right)$$

$$\text{or } \pi = \frac{699\,V_0^2 - E_y}{3.98\,y + 7.68} \qquad (5)$$

π has been plotted against y for a range from 0 to 9 for values of V_0 :—12, 10, 8, 6, 4 (Fig. 26). From the graph it is possible to find the value of y corresponding to any value of π up to 5,000 lbs. per sq. in.

If the piston movement after the valve closes is x inches before the aeroplane is brought to rest, the total energy absorbed is





$$E_{y+x} + 3\cdot98\,\pi y + 3\cdot98\,\pi \times 1\cdot93\,(1 - 10^{-0.225\,x}) \text{ inch lbs.}$$

and this $= \frac{3W}{g} \times V_0^2$.

But $$E_y + 3\cdot98\,\pi y = \frac{3W}{g}\left(V_0^2 - \frac{\pi}{91}\right)$$

$$\therefore E_{y+x} - E_y + 3\cdot98\,\pi f(x) = 7\cdot68\,\pi$$

or $$E_{y+x} = E_y + 3\cdot98\,\pi \{1\cdot93 - f(x)\} \qquad (6)$$

For a given value of π, determined beforehand, y can be found for a given vertical landing speed, and hence E_y is known. If then the right hand side of equation (6) is plotted on the elastic work curve, the point of intersection will give the total extension.

In obtaining the above equation (4) has been used. This applies only when the retardation is due to the oleo alone, and so the work done by the oleo is less than this quantity. The work done by the elastic should, therefore, be greater, and so the value determined for $(y + x)$ is an inferior limit.

A superior limit is given by taking the retardation as constant after the valve closes ; under these conditions the energy absorbed is

$$E_{y+x} + 3\cdot98\,\pi_y + 3\cdot98\,\pi \cdot \frac{x}{2}$$

and hence $$E_{y+x} = E_y + 3\cdot98\,\pi \left\{1\cdot93 - \frac{x}{2}\right\} \qquad (7)$$

For the particular case considered π was taken as 1,230, as the undercarriage was to be designed to be able to withstand the shock of a vertical speed of 12 ft./sec. and the maximum travel permissible is 9½ ins. The following results are thus arrived at :—

V_0	y	E_y	$y + x$ Superior	$y + x$ Inferior
12	8·70	48100	9·22	9·19
10	6·70	27900	7·57	7·45
8	4·35	14100	5·59	5·42
6	2·08	5300	3·62	3·42
4	0·23	400	2·08	1·79

As will be seen the combination is effective up to a vertical velocity of 12 ft./sec. as far as piston travel is concerned. The maximum of thrust with this velocity is given after the piston has travelled 8·70 ins., and is equal to 18,600 lbs. This corresponds to a load factor of about 5, which again is about right.

The oleo gear is not, however, known satisfactorily until the maximum pressure per square inch on the return stroke is determined.

To determine this step by step integration is necessary.

As before

$$\frac{p}{\rho} = \frac{V^2}{2g} \cdot \frac{A^2}{a^2}\left(1 + \frac{Fl}{m}\right)$$

where now A is only 2·21 sq. in. because of the piston rod

$$p = 28\cdot1\,V^2$$

$$pA = 62\cdot1\,V^2$$

If T_e is the tension in the elastic at any time we have originally

$$p = 0,\ T_e = 15{,}600 \text{ lbs,}$$

At any other time the upward force Z on the aeroplane is given by

$$Z = T_e - pA$$

But $$2Z = \frac{W}{g} \cdot \frac{dV}{dt} = \frac{W}{g} V \frac{dV}{dx}$$

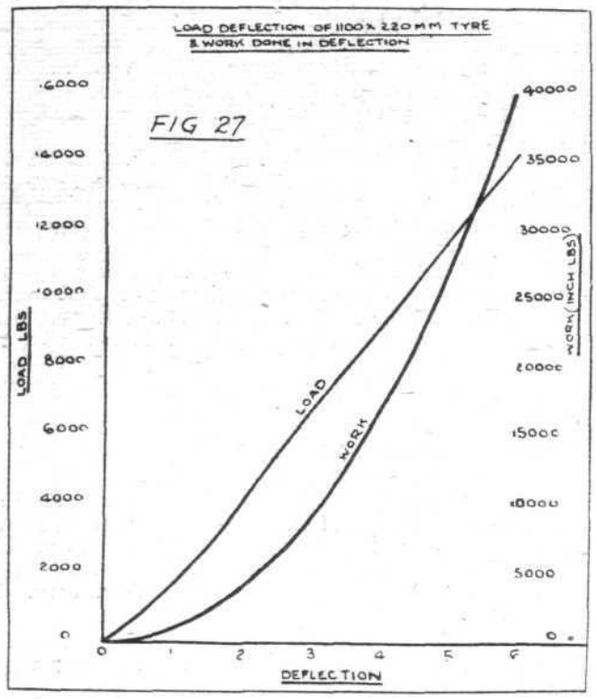
$$\therefore \int_{9-x}^{9} T_e dx = \int_0^x pA dx + \frac{W}{4g} \cdot V^2 \times 12 \text{ working in inch lbs.}$$

It is found that the maximum value for p is 1,350 lbs. and the final upward velocity of the aeroplane 6·9 ft./sec. The cylinder would, therefore, have to be stressed up to 1,350 lbs. pressure, and not 1,230.

To see whether the velocity could be damped still more, the orifices were reduced from ⅛ in. diameter to $\frac{3}{32}$. The results are given below side by side with those for the ⅛ in. orifices.

Diameter of orifices, inches ..	⅛	$\frac{3}{32}$
Max. p on downstroke, lbs./sq. in.	1230	1750
Max. V on downstroke, ft./sec. ..	12	12
Piston travel, inches	9·20	8·36
Max. up thrust on aeroplanes, lbs...	18600	18200
Max. p on upstroke, lbs./sq. in. ..	1350	2450
Max. V on upstroke, ft./sec. ..	6·9	5·1
Final V upwards, ft./sec.	6·9	4·0

So far the wheels have been supposed very rigid so that they only absorb the kinetic energy of the wheels and axle. As pneumatic tyres have a good shock-absorbing capacity their effect cannot be neglected, and the modifications required to include them are outlined below (Fig. 27). The load deflection curve for the tyres is one supplied by the



Palmer Tyre Co.; it has been extended a little beyond the range given by them, but it is hoped that no error has thereby been introduced. The method now is entirely step by step integration, and has been carried on until the velocity, vertically, of the aeroplane has been reduced from 12 to 2·3 ft. per sec. By this time 97 per cent. of the total energy has been absorbed. For the remaining 3 per cent. an approximate further movement cannot be far wrong.

Let W = weight of aeroplane less wheels and axle.
w = weight of wheels and axle.
$a - x$ = distance from cylinder head to piston head.
$r - z$ = distance from axle to ground.
then $x + z$ = aeroplane travel.
z = axle travel.
$V = \dot{x} + \dot{z}$ = aeroplane speed.
$u = \dot{z}$ = axle speed.
T_e = tension in elastic.
pA = pressure on piston.
P = pressure on ground.

We have then

$$P - T_e - pA = -\frac{w}{2g}\dot{u} \qquad (8)$$

$$T_e + pA = -\frac{W}{2g}\dot{V} \qquad (9)$$

work done

$$= (T_e + pA)(dx + dz) + (P - T_e - pA) \times dz \qquad (10)$$

and $p = 91\ (V - u)^2$ as above.

Till P′ the pressure at the hornblock $= o$, *i.e.*, until the initial tension in the elastic is overcome, $x = o$ and

$$P = -\frac{W + w}{2g}\dot{V} = \frac{W + w}{2g}V\frac{dV}{dz}$$

$$\int_0^{z_1} P\,dz = -\int_{V_0}^{V_1}\frac{W + w}{2g}\cdot V\,dV = \frac{W + w}{4g}(V_0^2 - V_1^2).$$

But

$$P + P' - T_e = -\frac{w}{2g}\dot{u} = -\frac{w}{2g}\dot{V}$$

$$\therefore T_e - P' = -\frac{W}{2g}\dot{V}$$

When

$$P' = o\ T_e = -\frac{W}{2g}\dot{V}$$

$$P = -\frac{W + w}{2g}\dot{V}$$

$$= \frac{W + w}{W}T$$

and therefore $\int_0^{z_1} P\,dz$ must be taken until $P = \frac{W + w}{W}T$

From the load deflection curve of the tyre we find the deflection z_1 and from the work deflection curve the work done. Hence the velocity V_1, when the oleo begins to act, is determined.

When the oleo is acting step by step integration is done as follows :—

The equations (8) and (9) become respectively

$$(P - T_e - pA)\,dz = \frac{w}{4g}(u_1^2 - u_2^2)$$

$$(T_e + pA)\frac{V}{u}\,dz = \frac{W}{4g}(V_1^2 - V_2^2)$$

where suffix 1 refers to speeds at the beginning and 2 at the end of each interval taken and V/u is an average for the interval. This form of the equations is used so long as u is greater than $\frac{1}{2}V$.

When u is less than $\frac{1}{2}V$ the equations are taken in the form

$$(P - T_e - pA)\frac{u}{V - u}\,dx = \frac{w}{4g}(u_1^2 - u_2^2)$$

$$(T_e + pA)\frac{V}{V - u}\,dx = \frac{W}{4g}(V_1^2 - V_2^2)$$

and average values taken for $u/V - u$ and $V/V - u$.

Applying this method to the same aeroplane as before, the analysis brings out the following points :—

(1) The axle is first brought to rest. The tyre deflection is increasing more and more slowly.

(2) The axle remains practically at rest, but the velocity of the aeroplane is falling steadily.

(3) The axle begins to move downwards again and the tyre deflection increases and then the axle comes to rest once more.

The load on the tyres is now a maximum and of the order of 12,000 lbs., this being also the upward thrust on the aeroplane.

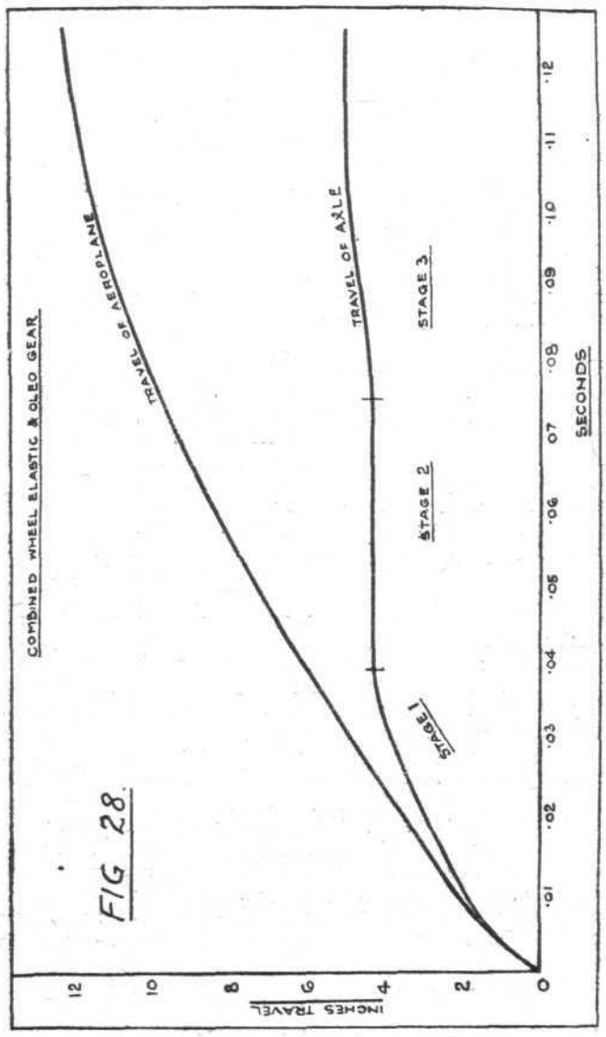
The approximate further extension of the elastic is 0·3 ins.

The values of V, x and z at end of the various stages are as under :—

	Initial.	1st Stage.	2nd.	3rd.
V	12	9·8	6·8	2·3
x	0	2·2	5·6	7·6
z	0	4·3	4·3	5·1

From this investigation the initial 100,600 inch lbs. of energy (half that of the aeroplane) are absorbed as under :—

Elastic	38,600 inch lbs.
Wheel	28,800 ,, ,,
Oleo	33,500 ,, ,,



THE INSTITUTE OF AERONAUTICAL ENGINEERS

THIS Institute, which was founded in 1919, "To promote the science, art and practice of aeronautical engineering and all branches of mechanical construction allied thereto," held a meeting at the Holborn Hall on January 16, last The Council of the Institute is constituted as follows for 1920: Professor G. H. Bryan, F.R.S., President; Mr. L. Howard-Flanders, Vice-President; Mr. W. O. Manning; Mr. F. Koolhoven; Mr. H. P. Folland; Mr. T. C. Letcher; Group-Capt. A. M. Longmore; Mr. H. B. Molesworth; Mr. F. G. Moore; Mr. Frederick R. Simms; Mr. W. Glass and Maj. J. Sowrey. The Secretary is Mr. Douglas Shaw, and the offices of the Institute are at 32, Charing Cross, Whitehall, S.W. 1.

A Presidential Address was given by Professor G. H. Bryan. After referring to the transition period in which the industry now finds itself, Professor Bryan mentioned the fact that during the War it was sometimes necessary to sacrifice conditions of safety that would be important in peace time in order to obtain greater immunity from war risks, and expressed his gratified surprise that his theoretical work on inherent stability did not share that fate. He then stated some personal experiences of flying and expressed his faith in the safety of flying. Referring to the foundation of the Institute of Aeronautical Engineers, Professor Bryan said: "The only difficulties were, firstly, the possibility of objections being raised on the ground that a Royal Aeronautical Society exists and what more could be wanted? and, secondly, the fear of an impression getting abroad to the effect that I should be wanting to make our Institute too mathematical, thus deterring from joining us the very class of practical man that we hope to encourage. I should like, in the first instance, to state that so far from being wanting in loyalty to the Royal Aeronautical Society I have been largely influenced by my belief that this Institute instead of weakening that Society, is calculated to greatly strengthen its influence and prestige, if not now, at any rate in the near future. I should be very sorry if we diverted a single member, actual or prospective, from the ranks of the Royal Aeronautical Society, and I hope, on the other hand, that that Society may gain many recruits from our ranks. I take it as a happy augury for co-ordination between the two bodies that so many that have joined us have the letters A.F.R.Ae.S. after their names.

"As regards the second possible objection, it should be obvious that there is a right and a wrong place for subjects like mathematics. I hope later to show the many struggles I have been making to build up the right place, but it should be sufficiently obvious that this Institute would be the last place in the world to choose for the purpose, and when I saw a reference to higher mathematics in our draft rules and objects I wrote off at once saying that this would never do, and suggesting mechanical science as an alternative title. We must be technical rather than theoretical, investigators rather than inventors, and we must appeal to practice rather than to principles. A friend of mine, whom I greatly respect, expressed the opinion that I was associating myself with people who would not understand me nor I them. Now aeronautics is a subject which co-opts nearly every branch of science, and knowledge; botany, psychology, economics, medicine, law, electricity, optics, meteorology, chemistry, physics, pure and applied mathematics, banking and finance, astronomy, are all laid under contribution. There is no other subject in which it is so necessary for all sorts and conditions of men to get to understand each other. Personally, I want to come into the closest possible touch with a class of workers for whom I entertain the highest respect and admiration."

Professor Bryan then went on to relate some of his difficulties in getting mathematicians, especially pure mathematicians, interested in subjects connected with the aeroplane, and stated that for the last twenty years these gentlemen had turned a deaf ear to what he had been preaching to them about turning some of their abilities to use in aerodynamic problems. The speaker then said:—

"In the first year of my research grant, working at Bristol with Dr. Brodetsky and Mr. D. N. Williams, I obtained a new solution of the motion of aeroplanes, which if properly developed, both mathematically and experimentally, would do for aviation what Newton's law of gravitation has accomplished for astronomy. It would enable the motion of aeroplanes to be calculated beforehand under all possible conditions, both in still air and in gusts, in steady flight and in stunts. The main difficulties are lack of competent mathematical assistance and the large number of wind channel experiments involved. But for these difficulties the discovery would be an epoch-making one, revolutionising our methods of aircraft design. It, however, will be a long time before results of proved utility can be attained. But is there any such well-defined goal in view in the work which is now receiving an amount of attention from scientific men which might have sufficed for the purpose?

"In view of the fact that the tip velocity of certain airscrews falls not far short of the velocity of sound, experiments were made at Farnborough with a screw the tip velocity of which reached 1,180 ft. per second, thus exceeding that of sound by 80 ft., and I witnessed these experiments. In order to understand the phenomena, the first step was to extend the theory of streamline motion to compressible fluids, a problem which had never been attempted before with the exception of a paper by Lord Rayleigh. Although I approached certain distinguished Cambridge mathematicians, nobody could be found capable and willing to plot the streamline diagrams required to illustrate the subject. Nevertheless my reports show the change of type which takes place at the velocity of sound, and the methods are applicable without any limitation of speed. I have been personally present at some experiments on H.M.S. *Excellent*, and also at spinning tests at the R.A.E. (May 15, 1919), and I consider the agreement between theory and experiment to be as close as could be anticipated in view of the different assumed conditions.

"The problem of sound emission from such a high-speed screw, and especially the painful physiological sensation near the plane of rotation, requires for its explanation a principle of relativity quite distinct from that which is now occupying the time and brains of so many pure theorists. The problem now before us is to apply methods to the navigation of aircraft when the surface of the earth is obscured by clouds or fog. By producing a report and observing the time that elapses before its echo reaches the observer, the distance he is from the surface of the earth can be determined. It is obvious that an aneroid only gives the altitude and fails to warn him of the danger of crashing into a range of mountains having a greater altitude than his. With adequate acoustic appliances and proper training a pilot ought to be able to judge to within 50 ft. how far he is off the ground.

"But for finding his way in the air other data are needed, and two distinct problems arise: one in connection with the maintenance of regular air services like the Paris one, the other in connection with trans-oceanic and similar flights. In the former the requirements are most easily provided for by a suitable network of acoustic signal stations forming base wires on the earth. In the latter the only base lines are those which can be found on the airship or aeroplane by attaching the apparatus to different parts of it, and apart from the echo method, the signals can only be produced by dropping exploding bombs overboard. These two alternative conditions form the subject of a specification drawn up conjointly by Sir Richard Paget and myself. If our proposals are adopted with any improvements that may be subsequently suggested it should be an easy matter to run the Paris, Brussels, and other future services practically independent of atmospheric conditions. The pilot, by observing the signals with the assistance of suitable chronometers, should be able to steer his course to within a furlong. When he approaches the aerodrome he should receive a group of signals, the intervals of which should indicate his compass bearing from the aerodrome, the interpretation being effected by an ingenious and very simple mechanical device. If he alters his course he will simply turn this device accordingly, and by this means he will be readily able to direct his course well into the space above the aerodrome, and to estimate his altitude as he descends to the ground. It must be a very thick London fog to cause any difficulty in landing, and probably such difficulties, if they still exist, will be soon overcome.

"Another application of acoustical methods, namely to the prevention of collisions at sea, is also available, and only waiting for its application to a similar use in connection with aircraft. When we remember the days when the transmission of a wireless signal across the room of a laboratory was considered a wonderful new discovery, and we realise that aircraft now regularly adopt this mode of communication, it seems almost surprising that we have had to wait so long for the corresponding adaptation of the far simpler acoustical methods of signalling. We may confidently look forward to the future age being an air age when aerial navigation will become the safest as well as the quickest form of locomotion. In that age I hope to see the Institute of Aeronautical Engineers working hand in hand with the Royal Aeronautical Society as the most popular and influential technical and scientific associations in the world."

FLIGHT
AIRCRAFT ENGINEER

"WORLD-WIDE AVIATION"

IN his lecture to L.C.C. teachers at King's College last week, Lord Montagu again expounded his very sound views with regard to the use which should be made of commercial aviation by the British Empire.

After an interesting summary of the history of aviation and the development of the R.A.F., he went on to suggest that shortly, owing to the widely-scattered character of the British Empire, distance would count for very little. It was time that would matter. Before long he believed they would see the journey between London and Rome done in the hours of daylight, and between London and Cairo in a little over 24 hours. Great Britain was in some respects unfavourably situated in regard to aviation. Being at the extreme north-western end of a great block of continuous land, comprising Europe, Asia, and Africa, Great Britain could be used on the way to America, but would be a terminus so far as Continental traffic was concerned.

Lord Montagu went on to point out that Egypt was in a very favourable geographical position, it was without fog, seldom had a strong wind, and sunshine was so common that people there began to hate the sun. It was destined in many respects to be the centre of continental aviation, certainly of the western half of Asia, the whole of Europe, and most of Africa. Whatever happened in the way of political developments in Egypt, it would be unwise to allow the aerodrome of Heliopolis—the Clapham Junction of the air—and the right of flying over Egypt to be in any other hands than those of the British Empire. Cairo, near which Heliopolis was situated, was 2,500 miles from London, 2,000 miles from East Africa, 4,000 from Cape Town, 2,000 from Karachi *via* Akaba, and 5,000 from Cape Londonderry for Australia, *en route* for New Zealand.

For very short distances he thought the use of the aeroplane did not compare favourably with the best railway expresses, but when the distances were long, as between London and Edinburgh, one began to save enormously. It did not pay at present to fly passengers; mail matter paying 1*s*., or perhaps up to 2*s*. 6*d*., a packet was much more profitable. Unless cable companies woke up we should, he believed, be sending airgrams instead of telegrams to distant places before many years were over.

The noise and the cramped position in an aeroplane were not favourable to much passenger carrying for long distances. Nor did he think flying would be a cheap form of locomotion for some time to come. With regard to airships, he pointed out that during the War our airships flew over 2,500,000 miles, chiefly in bringing convoys and in scouting over the North Sea, while one German airship made one trip of 4,500 miles during the War or as far as from London to Bushire. Airships would extend their sphere of usefulness.

We wanted a live policy in this country with regard to the development of aviation. After referring to the Bombay-Karachi service, he said he saw no signs in this country of any attempt to establish local services or encourage our own aviation. He hoped such encouragement would be forthcoming, and that he might next year see Gen. Sykes with a large share in the estimates.

He estimated the cost of running an ordinary two- or three-seater aeroplane at about 2*s*. 6*d*. a mile. The life of a well-constructed aeroplane might, he thought, be taken as about 600 hours, or 60,000 miles of flying. A first-class airship cost at least £150,000, and the cost of running per mile was, therefore, much greater. He believed the airship would be used for long trans-continental distances and aeroplanes for shorter distances.

How would London fare under the new system? At present you had to go out 10 miles for an aerodrome. He was not sure we should not have to construct an overhead landing-ground in the centre of London—there was nothing impossible or particularly ugly in such a scheme. He was not sure he would not take a house himself under the glass roof. He would be loth to cut up Hyde Park or Regent's Park, but if a scheme could be framed which would not interfere with the houses or parks, it might be possible to have a great central London aerodrome.

The next war might come with appalling suddenness, and we ought to have a peaceful commerce carrier which could be converted into a means of defence in case of need. That could only be done by encouraging civil aviation. The Government should encourage both internal aviation and oversea Imperial aviation. There were six routes which might be taken in hand in course of time. First, we should take in hand the route to the East and Egypt and India. Let us have a good bi-weekly service to India. Later we could try the Cape, Canada, and other parts of the Empire. There were six main Imperial routes from England to the rest of the Empire:—(1) England to North America and Canada, *via* Newfoundland; (2) England, *via* France and Spain to West Africa; (3) England, *via* France and Italy to Egypt, India, and the Cape; (4) India to Burma, the Federated Malay States, Australia, and New Zealand; (5) India and Burma to Hong-Kong; (6) Australia to British Polynesia and the South Sea Islands.

This country could not afford to stand still in aviation. Now that the War was over we ought not to let the magnificent organisation built up during the War fall to the ground. We must try to keep together the splendid body of pilots and mechanics who made our service so efficient. We must see that the lead our manufacturers gained was maintained. That could only be done by the co-operation of manufacturers, Parliament, and the Government in stimulating, and perhaps at first subsidising, certain civil air routes in this country, so that we might have these magnificent men and machines used in the arts of peace and ready in case of war.

Personals.

Deaths

Lieut. JIM PIPE, 31st Squadron, R.A.F., who was killed on the Indian Frontier on December 31, 1919, at the age of 21, was the eldest son of Maj. and Mrs. A. W. Pipe, 63, Cumberland Street West, Glasgow.

Married

Capt. FRANCIS HENRY COLEMAN, R.A.F., was married on January 7 at St. James' Church, Tunbridge Wells, to MARY MCLAURIN, youngest daughter of A. McLaurin MONTEATH, of Woodlands, Tunbridge Wells, and The Broich, Crieff, Perth.

PHILIP HORSLEY FLOOD-PAGE (late Capt., R.A.F. and R.A.S.C., T.F.) was married on January 10 at Steyning Parish Church, to BARBARA, youngest daughter of W. POWELL BREACH, J.P., and Mrs. Powell Breach, of Steyning, Sussex.

Capt. LIONEL DOUGLAS DALZELL-MCKEAN, R.A.F., youngest son of Mr. and Mrs. Dalzell-McKean, of Rathgar, Dublin, was married on January 7 at Epsom Parish Church to PHYLLIS MAUDE, youngest daughter of Mr. and Mrs. WARREN, of Burghdown, Epsom.

To be Married

The engagement is announced between Capt. CHARLES MAURICE DOWN, 1st Hertfordshire Regt. (T.F.), late R.A.F., only surviving son of Mr. and Mrs. F. J. Down, of Glengariff, Harpenden, Herts, and FLORENCE, only daughter of Mr. and Mrs. F. H. WALTHEW, of Harpenden.

Items

Maj.-Gen. Sir F. H. SYKES, Controller-General for Civil Aviation, left London for Madrid on January 14.

The annual dinner for those who were officers in "A" Flight, No. 6 Squadron, R.A.F. during 1918 will be held at the Holborn Restaurant, 7.15 p.m., Saturday, January 31. Particulars can be had from G. J. Scaramanga, Vulcan Lodge, Horley, Surrey.

A Re-union dinner will be held in London during February for R.N.A.S. members, Eastbourne, 1917. Any of the ship's company stationed there previous to the formation of R.A.F. interested are asked to communicate with King and Russell, at 14, Old Bond Street, London, W. 1.

The will of Mr. EDWARD POWELL, of Plas-y-bryn, Montgomery, chairman and managing director of Humber, Ltd., Coventry, a director of Pryce, Jones, Ltd., flannel manufacturers, chairman of Messrs. Drake, Driver and Leaver, Ltd., a director of the British Law Fire Insurance Co., Ltd., and of the Mawddy Railway Co., has been proved at £107,701.

THE ROYAL AIR FORCE

London Gazette, January 9

Administrative Branch

Sec. Lieut. (Hon. Lieut.) R. O'Brien relinquishes his commn. on account of ill-health contracted on active service, and is permitted to retain rank of Lieut.; Jan. 2.

The notification in *Gazette* of Aug. 22, 1919, concerning Lieut. H. Shaw is cancelled. Notification in *Gazette* of Oct. 31, 1919, to stand.

Technical Branch

Sec. Lieut. J. E. Tyrrell is graded for purposes of pay and allowances as Lieut. whilst employed as Lieut., Grade (A.); May 1, 1919 (substituted for notification in *Gazette* of Aug. 29, 1919).

Pilot Officers to be Flying Officers, without pay and allowances of that rank:—G. J. Maygothling, J. R. Wolley; Oct. 1, 1919.

Flight-Lieut. (Hon. Sqdn. Ldr.) C. C. Colley (Maj., R.F.A.) relinquishes his temp. R.A.F. commn. on return to Army duty; Dec. 12, 1919.

Capt. H. F. Melville relinquishes his commn. on ceasing to be employed; May 26, 1919.

(Then follow the names of 14 officers who are transfd. to the Unemployed List under various dates.)

Sec. Lieut. (Hon. Lieut.) J. W. Broughton relinquishes his commn. on account of ill-health caused by wounds, and is permitted to retain rank of Lieut.; Jan. 3.

The Christian names of Capt. Archibald Charles Smith are as now described and not Arthur Charles, as stated in *Gazette* Oct. 28, 1919.

The notification in *Gazette* June 6, 1919, concerning Capt. H. F. Melville is cancelled.

The notification in *Gazette* Dec. 12, 1919, concerning Sec. Lieut. J. G. Wright is cancelled; notification in *Gazette* Nov. 21, 1919 to stand.

Medical Branch

Wing Comdr. J. St. J. Murphy (Surg.-Comdr., R.N.) relinquishes his temp. R. A. F. commn. on return to Naval duties; Jan. 1.

(Two officers transfd. to Unemployed List.)

Memoranda

Flight-Lieut. K. B. S. Greig is granted hon. rank of Sqdn. Ldr.; Nov. 14, 1919.

(Then follow the names of 28 Overseas Cadets granted temp. commns. and 10 Cadets granted hon. commns. as Sec. Lieuts.)

Proby. Flight Officer L. C. G. Hayne is granted an hon. commn. as Sec. Lieut.; Feb. 22, 1919.

Wing Comdr. G. M. Griffith (Maj. (Temp. Col.), R.G.A.) relinquishes his temp. R.A.F. commn. on return to Army duty; Dec. 1, 1919.

Temp. Hon. Lieut. (Hon. Capt.) W. S. Kellar relinquishes his commn. on ceasing to be employed; Oct. 31, 1919. (Substituted for notification in *Gazette* of Oct. 10, 1919.)

(Four officers transfd. to the Unemployed List.)

London Gazette, January 13

Permanent Commissions

The classification of Capt. F. L. J. Shirley, M.C., is (S.O.) and not (Ad.) as stated in *Gazette* of Aug. 1, 1919.

The notification in *Gazette* of Oct. 28, 1919, appointing Flight-Lieut. W. D. Thom, D.F.C. (A.), to a permanent commn. is cancelled.

The notification in *Gazette* of Aug. 1, 1919, appointing Lieut. F. J. Bailey (S.) to a permanent commn. is cancelled.

The following temporary appointment is made:—

Staff Officer, 1st Class (Air).—Wing Comdr. R. G. D. Small; Jan. 1.

Flying Branch

Wing Comdr. R. A. Cooper, D.S.O., to be Wing Comdr. (A.), from Air Attaché; Dec. 11, 1919.

Maj. D. C. S. Evill, D.S.C., A.F.C., is graded for purposes of pay and allowances as Lieut.-Col. whilst employed as Lieut.-Col. (A. and S.), from May 1, 1919, to July 31, 1919.

Sqdn. Ldr. V. Gaskell-Blackburn, D.S.C., A.F.C., to be Sqdn. Ldr. (A. and S.), from (S.O.); Oct. 18, 1919.

Flight-Lieut. V. R. Gibbs, D.S.C., to be Flight-Lieut. (A.), from (S.O.); Dec. 6, 1919.

Capt. H. A. H. Leetham is graded for purposes of pay and allowances as Capt. whilst employed as Capt. (A'ship); May 1, 1919.

The following Lieuts. are graded for purposes of pay and allowances as Capts. whilst employed as Capts. (A.):—R. A. Spencer (from May 1, 1919, to Sept. 11, 1919); W. A. Reeves (July 5, 1919).

Sec. Lieut. A. Tyler to be Lieut.; July 5, 1919.

E. F. Nichol, M.C. (Capt., N. Lan. R.), is granted a temp. commn. as Sec. Lieut. (A.), and to be Hon. Capt.; Aug. 17, 1918 (since deceased) (substituted for notification in *Gazette* of Jan. 9).

The following Cadets are granted a temp. commn. as Sec. Lieut. (A.):—L. E. Speelman; Oct. 17, 1918. 317172 H. Wilson; Nov. 10, 1918.

The following are placed on half-pay list:—Flying Officer C. E. H. Allen, D.F.C.; Dec. 18, 1919. Flight-Lieut. R. Halley, D.F.C.; Jan. 4.

The following relinquish their temp. R.A.F. commns. on return to Army duty:—Pilot Officer (Hon. Flying Officer) C. T. de Guise (Lieut., Quebec R.); March 31, 1919. Flying Officer A. G. Goulding, M.C., D.F.C. (Lieut. (actg. Capt., Nova Scotia R.); April 9, 1919. Lieut. A. G. Goulding, M.C., D.F.C. (Lieut., actg. Capt., Nova Scotia R.); April 9, 1919. Pilot Officer (Hon. Flying Officer) A. H. Belliveau (Lieut., Can. For. Corps); April 13, 1919. Flying Officer (Hon. Flight Lieut.) W. G. B. Martin, M.C. (Capt Alb. R.), Flying Officer (Hon. Flight-Lieut.) J. H. Graham (Capt., E. Ont. R.); April 15, 1919. Flying Officer J. H. Kirk (Lieut., 13th Can. R. Bat.); April 17, 1919. Flying Officer L. Kert (Lieut., Can. Rail. Troops); April 18, 1919. Flying Officer W. H. Dixon (Lieut., Manitoba R.), Pilot Officer (Hon. Sqdn. Ldr.) A. B. Mason (Maj., Nova Scotia R.); April 19, 1919. Flying Officer G. W. Butchart (Lieut., 8th Can. Res. Bat.); April 30, 1919. Flying Officer G. R. Long (Capt., Manitoba R.); May 9, 1919. Flying Officer G. B. Pershouse (Lieut., N. Staff. R.), Flying Officer J. C. Burney-Cumming (Lieut., Gord. Highrs.); Nov. 8, 1919. Flying Officer (Hon. Flight-Lieut.) L. W. Schneider (Lieut., Capt., T.F., R.F.A.), Flying Officer H. H. James (Lieut., Manch. R.) (substituted for notification in the *Gazette* of Dec. 16, 1919); Nov. 17, 1919. Pilot Officer L. Radford (Lieut., R.G.A.); Dec. 11, 1919. Flying Officer M. V. Molony (Lieut., R.W. Kent R.); Dec. 23, 1919. Flight-Lieut. J. O. C. Orton, M.C., A.F.C. (Capt., Norf. R.); Dec. 31, 1919. Flying Officer R. E. W. Sandall (Lieut., Linc. R.); Jan. 6.

The following relinquish their commns. on ceasing to be employed:—Sec. Lieut. (Hon. Lieut.) J. R. Houghton (Lieut., R. War. R., T.F.); Feb. 12, 1919. Lieut. A. J. Virgo; Oct. 17, 1919.

(Then follow the names of 69 officers who are transfd. to the Unemployed List under various dates.)

The following Lieuts. relinquish their commns. on account of ill-health and are permitted to retain their rank:—A. Swales (caused by wounds); Jan. 5. J. J. Birkenshaw (contracted on active service), J. M. Carroll (contracted on active service); Jan. 6. F. M. Ohrt (contracted on active service); Jan. 9 (substituted for notification in the *Gazette* of Dec. 30, 1919).

The following Sec. Lieuts. relinquish their commns. on account of ill-health, and are permitted to retain their rank:—S. C. Ridges; July 12, 1919 (substituted for notification in the *Gazette* of Aug. 1, 1919). H. M. Matthews (caused by wounds), F. H. Stock (caused by wounds); Jan. 6. S. Pike (contracted on active service); Jan. 7. Sec. Lieut. G. E. Davidson is antedated in his appointment as Sec. Lieut. (A. and S.); April 1, 1918 (since killed).

Lieut. I. V. Lawrence is dismissed the service for absence without leave; Feb. 15, 1919.

The initials of Lieut. F. T. Muncey are as now described, and not as stated in the *Gazette* of Jan. 21, 1919.

The surname of Pilot Officer J. P. Skrdlant is as now described, and not as stated in the *Gazette* of Dec. 30, 1919.

The Christian names of Sec. Lieut. Ernest Sandford Clark are as now described, and not as stated in the *Gazette* of Dec. 23, 1919.

The notification in the *Gazette* of Nov. 4, 1919, concerning Lieut. A. J. Virgo is cancelled.

The notification in the *Gazette* of Feb. 7, 1919, concerning Sec. Lieut. S. C. Ridges is cancelled.

The notification in the *Gazette* of Dec. 12, 1919, concerning Sec. Lieut. C. A. Goatcher is cancelled.

The notification in the *Gazette* of March 21, 1919, concerning Sec. Lieut. (Hon. Lieut.) J. Houghton is cancelled.

The notification in the *Gazette* of April 25, 1919, concerning Sec. Lieut. H. Jackson is cancelled.

The notification in the *Gazette* of May 23, 1919, concerning Sec. Lieut. C. Rigby is cancelled.

The notification in the *Gazette* of Sept. 16, 1919, concerning Sec. Lieut. J. McRobert is cancelled, notification in the *Gazette* of Nov. 4, 1919, to stand.

Administrative Branch

The following Lieuts. are graded for purposes of pay and allowances as Capts. whilst employed as Capts.:—H. M. Kendle; May 1, 1919. W. E. Berwick, M.B.E.; from May 1, 1919, to July 4, 1919.

Lieut. C. E. Tidy to be Lieut., from (A.); April 29, 1919 (substituted for notification in the *Gazette* of June 3, 1919).

Flying Officer G. R. McCubbin, D.S.O., to be Flying Officer, from (S.O.); Oct. 12, 1919.

Flying Officer L. C. Boyd to be Flying Officer, from (A.); Dec. 8, 1919 (substituted for notification in the *Gazette* of Jan. 2).

Sec. Lieuts. to be Lieuts.:—R. M. Cobb; Dec. 21, 1918. A. J. Coxon; March 1, 1919.

Pilot Officer F. D. McClinton to be Flying Officer; Oct. 23, 1919.

The following Sec. Lieuts. are graded for purposes of pay and allowances as Lieuts. whilst employed as Lieuts.:—E. P. Pearce; from May 1, 1919, to Oct. 9, 1919. A. J. Litton; June 22, 1919. F. W. Johnson; from July 24, 1919, to Oct. 25, 1919.

The following Sec. Lieuts. (late Gen. List, R.F.C., on prob.) are confirmed in rank as Sec. Lieuts.:—H. S. Harwood; Nov. 23, 1918. E. H. B. C. Linton; April 18, 1919.

The following relinquish their temp. R.A.F. commns. on return to Army duty —Flying Officer S. J. Stocks (R.E.); Oct. 30, 1919 (substituted for notification in the *Gazette* of Nov. 18, 1919). Flying Officer J. E. Hardy (Lieut., Notts. and Derby. R.); Nov. 17, 1919. Flight-Lieut. G. B. Pratt (Lieut., R.F.A.); Dec. 1, 1919.

(Then follow the names of 27 officers who are transfd. to the Unemployed List under various dates.)

Capt. A. Toomey (Capt. and Qrmr., Gen. List, T.F.) relinquishes his commn. on account of ill-health (contracted on active service), and is permitted to retain his rank; Dec. 12, 1919.

The following Sec. Lieuts. relinquish their commns. on account of ill-health and are permitted to retain their rank —A. W. T. Wright; April 5, 1919 (substituted for notification in *Gazette* Dec. 20, 1918). T. Bracewell (contracted on active service); Jan. 6. H. Castle-Mason; Jan. 7.

The notification in *Gazette* Dec. 30, 1919, concerning Lieut. H. A. Jones, M.C., is cancelled.

The notification in *Gazette* Oct. 14, 1919, concerning Lieut. G. Thomson is cancelled.

Technical Branch

Capt. J. H. B. Burgess is graded for purposes of pay and allowances as Maj. whilst employed as Maj., Grade (A.); May 1, 1919, to Aug. 17, 1919.

The following Lieuts. are graded for purposes of pay and allowances as Capts. whilst employed as Capts., Grade (A.):—W. L. Shaw, M.B.E.; May 1, 1919. W. R. Lewis; May 1, 1919, to May 28, 1919 (substituted for notification in *Gazettes* Sept. 16, 1919, and Sept. 23, 1919. W. D. Rhys; May 1, 1919, to June 23, 1919. H. Jones; May 1, 1919, to Aug. 1, 1919.

Sec. Lieut. J. G. Wright is graded for purposes of pay and allowances as Capt. whilst employed as Capt., Grade (A.); May 1, 1919, to Oct. 8, 1919; (substituted for notification in *Gazette* Oct. 21, 1919).

Lieut. K. D. G. Collier is graded for purposes of pay and allowances as Capt. whilst employed as Capt., Grade (B.); May 1, 1919.

Pilot Officer (actg. Flight-Lieut.) W. Borland to be Flying Officer and to retain the actg. rank of Flight-Lieut. while employed as Flight-Lieut.; Nov. 1, 1919.

The following Sec. Lieuts. are graded for purposes of pay and allowances as Lieuts. while employed as Lieuts. (Grade A.):—H. Bradford, J. S. Hilton, M. S. Keogh; May 1, 1919. (Hon. Lieut.) C. C. Clerk, from May 1, 1919, to Sept. 9, 1919. F. S. Wainscot, from May 1, 1919, to July 31, 1919.

Sec. Lieut. (Hon. Lieut.) F. J. W. Humphreys (since re-classified S.O.) to be Lieut. without the pay and allowances of that rank; April 2, 1918.

Sec. Lieut. A. E. Edwards to be Sec. Lieut., Grade (A.), from (Ad.); Dec. 14, 1918.

Sec. Lieut. E. J. Spearing to be Sec. Lieut., Grade (B.), from (Ad.); Aug. 1, 1918.

The following Flying Officers relinquish their temp. R.A.F. commns. on return to Army duty:—T Weir (Lieut. (actg. Capt.), W. Ont. R.); Dec. 14, 1918. R. A. C. Bush (Capt., R. Dub. Fus.); Jan. 1.

Flight-Lieut. R. Stansmore (Eng. Lieut.-Comdr., R.N.) relinquishes his temp. R.A.F. commn. on return to Naval duty; Dec. 3, 1919.

(Then follow the names of 40 officers who are transfd. to the Unemployed List under various dates.)

The following Lieuts. relinquish their commns. on account of ill-health,

and are permitted to retain their rank :—S. N. S. Kennedy (caused by wounds) ; Jan. 5. V. E. R. Bolton (caused by wounds) ; Jan. 7.

Sec. Lieut. H. P. Johnson relinquishes his commn. on account of ill-health, and is permitted to retain his rank ; Jan. 7.

Sec. Lieut. A. Harris is cashiered by sentence of a General Court-martial ; Dec. 12, 1919.

The notification in the *Gazette* of Nov. 4, 1919, concerning Lieut. A. E. Burton is cancelled. Notification in the *Gazette* of Nov. 25, 1919, to stand.

The notification in the *Gazette* of Nov. 4, 1919, concerning Sec. Lieut. (Ho n. Capt.) J. H. McCullock is cancelled.

The notification in the *Gazette* of Sept. 9, 1919, concerning Lieut. G. A. B. Wheldon is cancelled.

The notification in the *Gazette* of July 22, 1919, concerning Lieut. A. O. Roberts is cancelled.

Medical Branch

Flying Officers to be Flight Lieutenants.—D. Cromie ; Oct. 25, 1919. J. B. Barrett, C. H. Young ; Dec. 16, 1919.

Sqdn. Ldr. E. G. R. Lithgow (Maj., R.A.M.C.) relinquishes his temp. R.A.F. commn. on return to Army duty ; Jan. 1.

Flight-Lieut. E. Hefferman (Surg.-Lieut., R.N.) relinquishes his temp. R.A.F. commn. on return to Naval duty ; Jan. 1.

(Four officers transfd. to the Unemployed List.)

Memoranda

Pilot Officers to be Flying Officers—D. J. Walker ; Oct. 8, 1919. H. E. Crowcroft ; Dec. 10, 1910.

(Four officers transfd. to the Unemployed List.)

Corrections

The following correct names and descriptions of the following are as now stated, and not as published in the *Gazette* of Dec. 30, 1919 and Jan. 1, p. 5, Lieut.-Col. (Temp. Maj.-Gen.) Henry Francis Edward Freeland, C.B., D.S.O., M.V.O., R.E. ; Francis Dundas Couchman, Esq., M.I.C.E., Member Railway Board ; James Algernon Stevens, Esq., O.B.E., Imperial Customs Service, Chief Collector of Customs, Rangoon, Burma.

Royal Aeronautical Society

THE next meeting of the Royal Aeronautical Society will be held at the Royal Society of Arts,, on Wednesday evening, February 4th, when Squadron-Leader J. E. M. Pritchard, O.B.E., will read a paper on "Rigid Airships and their Development." The chair will be taken at 8 p.m. by Air-Commodore E. M. Maitland, C.M.G., D.S.O., A.F.C.

Members, and particularly students of the Society, are reminded that the Library at 7, Albemarle Street, W. 1, is now open from 2 till 5 p.m. on Saturday afternoons.

Summer Time in France and Algeria

THE Air Ministry announces that the following Notice to Airmen (No. 7) has been issued :—

Summer Time in France and Algeria is to be introduced at midnight January 31, February 1, 1920, and will continue until midnight October 23, 1920.

The England-Australia Flight.

THE latest news with regard to the Blackburn Kangaroo, being piloted by Capt. Geo. H. Wilkins, is that he is still stranded at Suda Bay and that he is endeavouring to obtain a new engine from Cairo.

Lieut. MackIntosh and Lieut. Parer, of the Australian Flying Corps, who left Hounslow on a De H. 9 on January 9, arrived at St. Raphael on January 19. They left Lyons at 11.45 a.m., and arrived at 3.20 p.m. The clouds were low and conditions bad as far as Avignon.

Rhyl Wants More Flying.

RHYL evidently realises that flying is a desirable attraction, as, at the last meeting of the Urban District Council, it was reported that the Entertainments Committee had advertised for tenders for the sole use of the flying rights on the foreshore for next season.

H.P. London-Paris and Brussels Air Services.

ON the Handley Page London-Paris Air Service between September 2, 1919 and January 15, 1920, 652 passengers and 17,030 lbs. of goods have been carried, the total distance covered being 37,190 miles.

Two hundred and fifty-five passengers and 25,916 lbs. of freight have been carried on the H.P. London-Brussels Air Service during the period extending between September 26, 1919, and January 15, 1920, a distance of 26,353 miles having been covered.

On January 13 amongst the eight passengers flown to Paris in a Handley-Page commercial aeroplane was an old gentleman aged 73, who thoroughly enjoyed the journey, which was carried out in wind and rain.

For Flying Officers Visiting New York.

THE London Committee of the English-Speaking Union has received the following communication from Mr. Laurence L. Driggs, the President of the American Flying Club, 11, East 38th Street, New York City :—

"All British aviators visiting New York will be most cordially welcomed at the American Flying Club. They will find full club accommodation, and will meet representatives from practically every British squadron on the front. The British Air Attaché and his staff are already members of the club. We shall try to make every Englishman feel at home here."

The French Mission in Argentina

DURING the month of December the French Aviation Mission in Argentina carried out 33 trips from Buenos Ayres to Montevideo and back. The number of passengers transported by air totalled 312, the aggregate flying time was 160 hours, while the total distance flown was 15,000 miles.

During a flight from Bellavista aerodrome to Lima late on January 19 the French Lieut. Nehabrier was killed and Col. de Baudiez, Chief of the Mission, fatally injured, owing to their Caudron biplane suddenly falling from a height of about 250 ft.

An Aviette Height Prize.

To encourage experimenters with man-propelled flying machines, a prize of 500 fr., which may be increased to 700 fr., has been offered in France by M. Georges Dubois-Lecour. The winner will be the rider of an Aviette, who first succeeds in getting his machine to a height of 10 metres above the ground ; at present the "record" is 8 metres.

The Rome-Tokyo Flight.

THE small Caproni, which is acting as scout in the Rome-Tokyo flight, with Lieuts. Scavini and Bona Lumi as pilots, left Salonika at 9.30 a.m. on January 12 and arrived at Adalia without mishap at 3,30 p.m.

One of the large Caprini triplanes of 900 h.p., in charge of Lieuts. Garrone and Abba, left Rome at noon on Sunday and reached Gioia del Colle, near Taranto, the first stage of the Rome-Tokyo flight.

A sum of £7,000 has been voted by the Japanese Government for the entertainment of the Italian airmen flying from Rome to Tokyo.

From Fiume to Paris.

TOWARDS the end of the afternoon of January 18 an Italian S.V.A. (220 h.p. S.P.A.) machine, piloted by Lieut. Carminiani, of d'Annunzio's squadron, who had left Fiume at 7.30 in the morning, passed over Paris and let loose a shower of green leaflets. They proved to contain a message from d'Annunzio to the "Latin brothers" and included an attack on M. Clemenceau.

Reaching Le Bourget at 3 p.m., the pilot accomplished the 750-miles flight in 7½ hours, flying via Venice, Turin, Chambery Lyons, and Dijon, crossing the Alps at a height of 2½ miles.

Austrian Seaplanes for U.S. Navy

THE United States Navy now has two Austrian seaplanes which have been secured by the commander of the United States Naval forces in the Eastern Mediterranean, Rear-Admiral Philip Andrews, by arrangement with the Italian Government. One of the seaplanes has a 12-cylindered 450 h.p. Austro-Daimler motor, while the other has a six-cylindered 250 h.p. Hiero motor.

Aerial Services in Switzerland

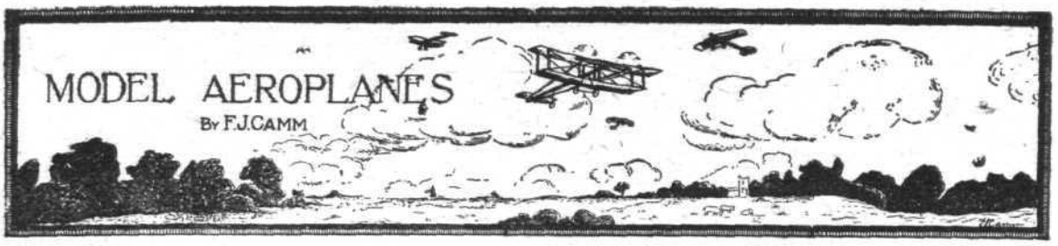
"AD ASTRA" is the name of a new company formed by ex-military aviators in Switzerland to carry on commercial aviation. At first a number of waterplanes will be put into commission at Zurich, Locarno, Bienne, and Thun, but later on, machines will be provided for Lausanne, Geneva, Lugano, Lucerne, Romanshorn, Neuchatel, and Rorschach. Eventually it is proposed to start aeroplane services for various towns that do not border on lakes or rivers that are of sufficient size to be used by hydro-aeroplanes.

Seeing the Alps by Aeroplane

SEVERAL flights from Zurich to St. Moritz have recently been made by the aviator Comte, carrying passengers who have enjoyed the novel experience of seeing the mountains from above. Comte is going on to Gstaad for a flying week, and other winter resorts are likely to follow suit as the demand for passenger flights at the higher altitudes is greatly increasing.

Police Aeroplanes over Berlin.

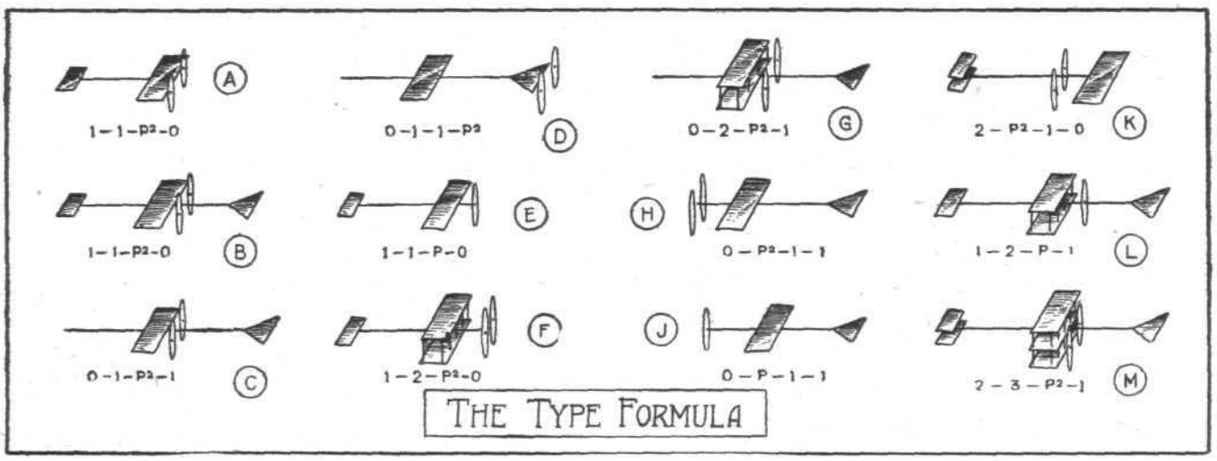
As a sequel to the riots in Berlin last week, low-flying police aeroplanes were engaged in patrolling over the roofs of the city on January 15, watching for an attempt to renew the Spartacist disturbances on the anniversary of the death of Rosa Luxemburg.



NOTE.—*All communications should be addressed to the Model Editor.*

The Type Formula

IN locomotive engineering it is customary to classify a particular engine by a formula, such as 0-6-2. Such classification, whilst being of little use in full-size practice, is admirably suited to typify models, since it brings into a particular class all models where a similar system of propulsion and surfacing obtains. The accompanying illustration shows diagrammatically the formula projected some years ago by Mr. E. W. Twining. It has been adopted to a small extent among some of the older clubs, and I certainly think it should come into more general use. Take A for example. The so-called "twin-pusher" machine is termed a 1—1—P2—0 machine. The first figure indicates that it has only one leading (or monoplane) surface, the second that the main surface is monoplane, P2 signifies that twin screws are used and 0 reveals that there is no tail. At one glance, therefore, the salient features are readily apparent, whereas the vague expression "twin-pusher" conveys but a hazy idea of the general design.



The position of the letter P in the formula settles whether the machine is tractor or *canard*. For instance, in Example J, 0—P—1—1, it is seen that there is (1) no surface in front of the screw; (2) a single screw; (3) a single main-supporting surface and a monoplane tail. When only one screw is used the term P is not qualified by any number. Example F shows a canard biplane; the two superposed foils being shown by the letter 2 in the formula; similarly M shows a triplane with biplane elevator, and this becomes 2—3—P2—1, because twin screws with a tail behind are used. The diagram should prove a useful reference when evolving new types.

Geared Motors

Figs. 1 and 2 show two types of geared motor useful in cases where a short drive is imperative. In Fig. 1 two short skeins are geared-up to the screw shaft so that the revolutions on the latter are double those on the skein. Fig. 2 shows a compact four-skein multiple-geared motor which may be used for "scale" flying models, as it enables the weight of the motor to be retained in a position relative to its prototype. This is an advantage, and eliminates the drawbacks to the lengthy skein otherwise necessary to ensure a reasonable duration of flight. Such a motor is quite self-contained, and may well be utilised to adjust the c.g.; it need weigh no more than 2 ozs.

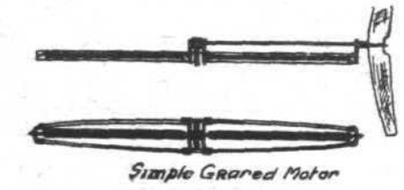


Fig. 1.

(To be continued.)

Model Competitions.

Mr. G. Ellis writes:—

"In your issue of December 11 you ask for suggestions for a Model Competition. Might I forward a few which I believe would greatly add to the interest of the competition, apart from tending to improve the general characteristics of the models entered?

"They are as follows:—

"(1) Quick rising contest for R.O.G. machines, the weight, loading and power of the machine being taken into account.

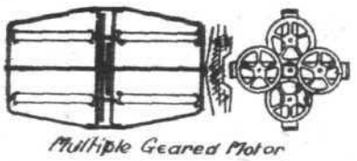


Fig. 2.

"(2) Variable speed test. Note whether this is obtained by varying the angle of incidence and the power.

"(3) Take-off from fairly rough ground. This would ensure a well-designed model with a substantial chassis and fittings.

"(4) Stability test. The model fully wound up and launched in an inverted position from the height of about 20 or 30 ft. (This would entail an erection after the style of a pylon at Hendon. Perhaps one could be borrowed for the occasion.)

"I would also like to see a combination of clubs to experiment with the lesser used types of models, such as the triplane, amphibians, twin-tractor machines, ornithopters and helicopters; one club taking up one type and carrying their trials to the bitter end. Meetings should take place every three months or more frequently, and the results published in FLIGHT's columns."

Replies to Correspondents.

J. C. (HAMPSTEAD).—Messrs. A. E. Jones, 52, High Street, New Oxford Street, W., can supply what you require.

R. E. H. F. (PHILBEACH GARDENS).—We replied direct to your letter.

FLIGHT

THE H.P. SERVICES IN BRAZIL

FOLLOWING lengthy negotiations, some detailed particulars are now available through Mr. Harry Harper, of the South American Airway arranged for by the Handley Page Co. The first service, from Pernambuco right down the South American coast to Buenos Aires, extends to 2,600 miles, with 12 air-ports on its route. The aim in planning the route has been to link up all towns of importance with the two terminal aerodromes, while the distances between alighting points have also been carefully studied. Through dividing the route into fairly short stages the aeroplanes are not required to carry heavy loads of fuel, which means they have all the more capacity for cargo. The total flight is accomplished in 11 stages, as indicated herewith :—

Stage.	Miles.
Pernambuco—Maceio	125
Maceio—Bahia	281
Bahia—Caravellas	325
Caravellas—Victoria	191
Victoria—Rio de Janeiro	281
Rio de Janeiro—San Paulo	234
San Paulo—Florianopolis	319
Florianopolis—Porte Alegre	250
Porte Alegre—Pelotas	176
Pleotas—Monte Video	297
Monte Video—Buenos Aires	125

As, to begin with, the route will be equipped only for daylight flying, and as it will be a three days' journey from end to end, it will be necessary to arrange sleeping and other accommodation for passengers at certain air-ports. Such night halts, with all comforts required, will be provided at Bahia, Rio de Janeiro, and Porte Alegre.

Even before night flying is attempted, and the journey is interrupted by darkness, air travellers between Pernambuco and Buenos Aires will save six clear days, as compared with the trip by mail-boat. When night flying equipment is installed it will be possible to traverse this whole 2,600 miles airway in about 39 hours. The Handley Page pilots will follow the coast-line, and it is fortunate that at almost every point there are firm white sands on which an aeroplane will be able to alight in emergency with perfect safety. Pilots will also be in touch by wireless with steamers passing up and down the coast.

Climatically the route is favourable, and in the northern sections ideal. Towards the south there are occasionally the fierce gales which are known as "pamperos"; but the approach of these can be forecasted. As to traffic prospects, Maj. Bellairs, who has been into the whole question with South American merchants, is confident that ample loads will be forthcoming. It is probable that the fee for an air-borne letter, right through from one end of the airway to the other, will not be more than about 3*s*.

RECRUITS WANTED FOR THE R.A.F.

WITH the reduced personnel required by a peace basis it is not easy to join the R.A.F., but for skilled men who are healthy and fit there will be a number of opportunities of joining up during the next three months, owing to the demobilization of the R.A.F. of the Army of Occupation. The call at present is for armourers, carpenters, clerks, instrument-repairers, drivers (petrol), electricians, fabric workers, hospital orderlies, photographers, riggers, vulcanisers, wireless mechanics, and wireless operators. It is quite possible, however, that other trades will be required soon, and those not qualified in any of the trades enumerated should send along their name and particulars so that they may be placed on the "waiting list." It must be clearly borne in mind, however, that only men who are fully skilled and thoroughly fit are required. They must be between 18 and 28, but, in certain cases, ex-service men will be taken up to the age of 38. The period of enlistment is 12 years, of which either four, six or eight years may be served with the colours, and the remainder in the reserve. There is ample scope for promotion for really smart men.

Pay on enlistment as aircraftsman II ranges from 3*s*. to 4*s*. per day, according to trade. The question of separation allowance is at present under review by the Air Ministry.

In Editorial Comment on page 90 we have drawn attention to the advantages of serving in the R.A.F., and it may be emphasised that it affords skilled men an opportunity of being able to work steadily at their trade, so that, whilst they are drawing good pay and qualifying for promotion, they are getting real knowledge and up-to-date experience, while, in addition, they have good food and all clothing and comfortable quarters.

The men get a liberal amount of time to themselves, and the sports side is not forgotten. plenty of opportunity and every facility being given for indulging in good, healthy outdoor pastimes.

Applications for enlistment may be made to any R.A.F. Depot or Station, or direct to The Inspector of Recruiting, 4, Henrietta Street, London, W.C.

There are also vacancies for promising boys between the ages of 14½ and 16½ years, and parents who are anxious for their sons to take up the R.A.F. as a career can obtain full information from the Local Education Authorities.

CORRESPONDENCE

AIR SCOUTS.

[1990] Your leading article entitled "Why Not Air Scouts?" contains a very sound proposition, and by the time this letter is published in your columns, I shall have dealt fully with the question, not forgetting an acknowledgment to FLIGHT, in the *Pall Mall Gazette*, but I should like to suggest in your own columns that a great deal of valuable and interesting propagandist work might be carried on meanwhile by your excellent journal. You run a splendid model section that appeals mainly to "the young idea." Would it not be possible for you to institute competitions calculated to induce research and experiment among youths? It might be by way of essays on certain aspects of flight, or by some other means chosen by you. But the prizes must be in *one form only*—viz., passenger flights. Many of your readers would subscribe a guinea or two towards these flights, and as during the coming summer "joy-ride" 'buses will be flying all over the country, the winners of the competitions would not have very far to go for their prize flights. The propagandist value of a passenger flight is enormous. It is the best prize that can be offered. Your own views, and those of your readers, would be interesting.

CLARENCE WINCHESTER.

Authors' Club, 17th January, 1920.

SIDE-WINDS

IT is interesting to note that the Napier engines of the Airco 9 R Aeroplane, which recently secured the 18 British records certified by the Royal Aero Club, was fitted with K.L.G. plugs. This is yet another testimony of the excellence of K.L.G. plugs. Another Napier achievement in which K.L.G. plugs also participated was the non-stop flight from London to Madrid in 7¾ hours. This was also performed on a machine fitted with Napier engines.

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IN connection with the Patent Act of 1919, which was recently passed, Messrs. Phillipss, of 70, Chancery Lane, W.C., write drawing attention to the material alterations in the practice of procedure of protecting inventions by Letters Patents. The most important of these are :—

(1) The period within which a Complete Specification can be lodged on an Application filed with a Provisional Specification is extended from six to nine months.

(2) A patentee can have his patent so marked as to indicate that he is prepared to grant licences under it.

(3) The investigation as to novelty is extended to publication in *any* document published in the United Kingdom.

(4) The term of a patent is extended from 14 to 16 years.

(5) Any patentee who can show that he has suffered loss or damage in the matter of a patent owing to a state of War may be granted an extension of the term of said patent.

(6) No one other than a Registered Patent Agent may describe himself as a Patent Agent, *i.e.*, one who, for gain, carries on the business of applying for or obtaining patents in this country or elsewhere.

COMPANY MATTERS

Rolls Royce, Ltd.

THE directors' report for the year ended October 31, 1918, states that it will be remembered that a dividend of 10 per cent. (less income tax) was paid in December, 1918, in respect of such period, on the directors' forecast, which it will be seen below proves to have been amply justified. After paying or providing for all trading expenses and suitable depreciation of buildings, machinery and plant, and making due provision towards the writing down to estimated post-War value and depreciation of new buildings, machinery and plant erected and installed for munitions of war purposes, and after charging repairs and replacements to revenue, and after making provision for estimated excess profits tax, the trading for the year has been ascertained to have resulted in a net profit of £153,261 13*s.* 3*d.*, as compared with £142,056 5*s.* 11*d.* for the previous year. The balance-sheet takes no account of the manufacture for War purposes in the United States of America, contracts for which were financed by the British Government.

The directors recommend that the balance of profits, after paying the dividends above mentioned, should be utilised as set out in the accompanying appropriation account. The directors recommend the formation of a Workers' Welfare Scheme, whereby one-half of the surplus profits above 10 per cent. on the capital (after carrying a limited sum to the reserve funds and providing for anticipated contingencies) will be applied towards houses, recreation grounds, gardens and other amenities of life for the workers. They also recommend that the workers should be allowed to subscribe for and hold during employment with the company, shares of a special class to be created for such purpose and to be called workers' shares, the worker paying for them at par by instalments, and on leaving the company's service re-selling them to the company's nominees also at par, the shares, subject to restrictions as to disposal, having the same rights as ordinary shares. To give effect to these two last proposals will require some amendments to the company's articles of association, and notice of meetings for the purpose of dealing with these proposals accompany this report.

The directors have recently caused a new company to be formed in the United States, under the name of Rolls-Royce of America Incorporated, to manufacture Rolls-Royce chassis and aero engines for North America and adjacent islands. It has an authorised capital of $7,500,000 preference stock, divided into 75,000 shares of $100 each and ordinary stock divided into 75,000 ordinary shares of no nominal value. The preference shares are entitled to a priority of capital in a winding-up and to a priority cumulative dividend of 7 per cent. per annum. Further, after the ordinary shares have received a dividend of $7 per share, the preference shares participate equally with the ordinary shares until the preference shares have received 10 per cent., when any balance of profit which it may have been determined to distribute will be payable to the ordinary shares. Thirty-five thousand of the preference shares have been issued to bankers at $90 per cent. and have been offered to the public in America for subscription, and, it is stated, have been fully subscribed.

Rolls-Royce, Ltd., have agreed to sell to Rolls-Royce of America Incorporated all their goodwill in North America in consideration of receiving an allotment of 35,000 of the ordinary shares. A number of these shares, not exceeding in the aggregate 9,750, will be transferable to bankers and others, as consideration for and in connection with the flotation and starting of the American company.

Arrangements have been made to supply from the Company's works at Derby the required technical officers, with a view to insuring the output in the United States being equal in quality to that at Derby.

NEW COMPANIES REGISTERED

M. L. EXPERIMENTAL, LTD.—Capital £60,000, in £1 shares. Acquiring certain inventions and patents relating to apparatus for aeroplanes, etc. Under agreements (1) with O. D. Lucas and H. P. Martin; (2) with the said O. D. Lucas; and (3 and 4) with Vickers, Ltd. Solicitor, F. H. E. Branson, 2, Bond Court, Walbrook, E.C.

OGILVIE INSTRUMENTS, LTD., Gwydir Chambers, 104, High Holborn, W.C. 1.—Capital £8,000 in £1 shares. Manufacturers of and dealers in aeronautical and other instruments, etc. Under agreement with the Aeronautical Instrument Co., Ltd. First directors: G. Brewer, G. N. Ogilvie, Lieut.-Col. F. K. McLean, and Maj. T. P. Searight.

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Index and Title Page for Vol. XI

The 8-page Index for Vol. XI of "FLIGHT" (January to December, 1919) is now ready, and can be obtained from the Publishers, 36, Great Queen Street, Kingsway, W.C. 2. Price 8*d.* per copy, post free.

IMPORTS AND EXPORTS, 1918-1919.

AEROPLANES, airships, balloons and parts thereof (not shown separately before 1910). For 1910 and 1911 figures see "FLIGHT" for January 25, 1912; for 1912 and 1913, see "FLIGHT" for January 17, 1914; for 1914, see "FLIGHT" for January 15, 1915; for 1915, see "FLIGHT" for January 13, 1916; for 1916. see "FLIGHT" for January 11, 1917; for 1917, see "FLIGHT" for January 24, 1918; and for 1918, see "FLIGHT" for January 16, 1919.

	Imports.		Exports.		Re-Exportation.	
	1918.	1919.	1918.	1919.	1918.	1919.
	£	£	£	£	£	£
January ...	49,402	555,989	24,765	57,571	—	—
February	51,941	453,822	13,545	57,972	—	—
March ...	47,930	704,424	11,451	72,716	1,000	400
April ...	33,342	97,662	10,815	25,433	—	—
May ...	942,866	136,631	67,224	38,428	—	—
June ...	864,296	1,410	35,658	41,526	—	—
July	1,834,293	136,463	10,800	41,290	—	—
August ...	566,137	67,292	71,503	60,581	—	—
September	505,160	172,192	8,033	65,349	100	—
October	294,835	132,243	9,166	87,635	—	500
November	410,557	44,713	75,811	67,831	—	7,200
Dec. ...	1,258,322	1,671,101	53,712	80,660	—	2,030
	6,859,081	4,173,942	539,945	696,992	1,100	10,130

▣ ▣ ▣ ▣

AERONAUTICAL PATENTS PUBLISHED

Abbreviations:—cyl. = cylinder; I.C. = internal combustion; m. = motors

APPLIED FOR IN 1918

The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

Published January 22, 1920

6,176. R. L. DAVIES. Clinometer apparatus for aircraft. (136,856.)
21,287. R. A. BRUCE. Tail planes. (138,882.)

APPLIED FOR IN 1919

The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

Published January 22, 1920

467. TITANINE, LTD., and P. E. BOWLES. Varnishes or dopes. (136,927.)
10,340. G. CAPRONI. Construction of wing cells of multiplane flying-machines. (125,995.)
15,279. A. AGUIRRE. Steering control mechanism of airships. (137,010.)

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